

ASSESSING PRIVATE FOREST LANDOWNER DECISION MAKING IN ILLINOIS:  
APPLIED MANAGEMENT SOLUTIONS FOR DIVERSE OBJECTIVES

BY

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THESIS

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## **Abstract**

Private forest landowners own nearly half of U.S. forestlands, providing a number of benefits to the American public: a refuge for biological diversity, watershed values, renewable timber production, carbon storage, recreation, and enjoyment. The private forestland base also faces a number of threats including development, parcelization, invasive species encroachment, damaging harvesting practices, and climate change. Decision making by private forest landowners has been a topic of keen interest for over a century as forestry practitioners have struggled to engage forest landowners. Recent studies show very few U.S. private forest landowners have a written management plan. Mail survey (n=532), interview (n=53), and participant observation methodologies were used in southern and central Illinois to assess private forest landowner engagement with forestry. First, logistic regression analysis of survey data was used to assess forest management actions of southern Illinois private forest landowners in the context of the contentious dialogue about the management of the Shawnee National Forest. Second, quantitative survey data about southern Illinois landowners' climate change perceptions were compared with qualitative interview responses about the array of ecosystem services accruing from their forestlands. Finally, an examination of applied techniques to meet current forestry challenges was facilitated through a partnership with the Illinois Department of Natural Resources in central Illinois. Results indicate amenities and cultural ecosystem services— aesthetic, spiritual, recreational, and heritage values—are highly enjoyed among most private forest landowners and integral to their decision making. Many landowners perceive that cultural ecosystem services are compromised by active management for timber production, ecosystem restoration, climate change mitigation, or other outcomes. Findings suggest that synergistic management strategies merging the enjoyment of cultural ecosystem services with the

production of other ecosystem services will effectively engage private forest landowners. A preliminary framework of these management strategies is proposed.

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## **Chapter 1 – Introduction**

“One thing at least seems certain—that the public welfare is so vitally concerned in the conservation of forest resources as to make it unthinkable that the private owner alone can be permitted always to decide whether or not forest conservation shall take effect” (Pinchot, 1909, p. 12).

The timber supply problem characterized by wanton cutting and uncontrolled fire was so urgent on private forestlands just over 100 years ago that Gifford Pinchot implored government intervention to influence the decision making of private forest landowners. Today, the defining issues of private forest conservation have changed, but the ability of forest policymakers and practitioners to meet the needs of private forest landowners and consequently influence their decision making remains elusive. Few of the millions of private forest landowners participate in formal forestry programs. Most landowners do not engage state or private forestry practitioners to assist with forest management decisions, and only 1 of every 25 landowners has a written forest management plan (Butler, 2008). More than one million acres are lost each year to development and parcelization (Stein et al., 2005). The ecological function of untold more acres are impaired by invasive species and ill-advised harvesting practices. Climate change is a threat multiplier for private forests already at risk. Innovative measures are necessary to re-frame the problem of the private forest landowner.

The problem of the private forest landowner, or the inability of practitioners and policymakers to support the landowner decision-making process, signals a greater relevance problem for the field of forestry. The field is at a crossroads. Foresters hold little influence on most private forestland decisions (e.g. Butler, 2008), but their influence upon public lands is declining as well (Fairfax, 2005). Forest Service foresters have been increasingly phased out in favor of other environmental scientists. As forestry jobs and forestry education program

enrollments have declined, researchers have called for changes within the field that acknowledge the demands of landowners and other stakeholders (Hull, 2011; Luckert, 2006).

In Illinois, the 1983 Forest Development Act has been the defining policy in shaping the relationship between forestry practitioners and landowners. This piece of legislation which provides financial incentives to landowners requires participants to have a forest management plan for timber production written by a forestry practitioner. Of the 206,000 private forest landowners in Illinois (Crocker et al., 2005), the Illinois Department of Natural Resources states “over 80 percent have never received professional forestry management assistance” (Illinois Department of Natural Resources, n.d. para. 3). Among the state agency foresters and listed private consultants (many of whom are part-time or not active), 61 forestry practitioners serve 4.5 million acres of private forestland (Crocker et al., 2005). One practitioner per 3,377 landowners who own 73,770 acres exemplifies the national relevance problem.

Decades of research have examined this problem at national, state, regional, and local scales. The wealth of resulting information about landowners and private land policy has failed to inspire effective strategies to manage these forestlands at scales broader than scattered individual parcels. The research process described herein attempts to meet these calls with concrete forest policy and management strategies tailored to the needs of private forest landowners. Overall, this research seeks to investigate how the problem of the private forest landowner can be met with practical policy and management strategies.

The three chapters of the body of this thesis emerged from a process of inquiry which evolved over the course of the research (Dewey 1938). Each phase of the research built upon previous findings to more fully address the overall question. Methods and additional questions were adapted to the nature of the evolving inquiry.



To begin, Chapter Two examines how engaged private forest landowners in southern Illinois were with forestry practices using multivariate logistic regression analysis of survey data. Four actions of private forest landowners are examined: completing a written forest management plan, seeking advice from a forestry practitioner, completing timber stand improvement, or initiating commercial timber harvesting. The factors that influence these decisions are then explored. How do forestland objectives and demographics influence actions? Trends on the Shawnee National Forest are an integral component of this question. Are perceptions of forestry in general driving decision making, or is landowner disengagement with forestry simply a function of the shortcoming of private forestland assistance? With persistent conflict about the role of forest management in the Shawnee National Forest, this region provides a unique situation to assess the relationship of general forestry perceptions to private management actions, or lack thereof.

Chapter Three examines the opportunity to address climate change on private forestlands. Forestry researchers frame climate change as an opportunity for the field of forestry (Malmsheimer et al. 2008); yet how willing are landowners to change actions to address climate change? Landowners managing for financial outputs were expected to be less concerned about climate change while those not so interested in financial outputs were expected to be more environmentally-concerned about issues such as climate change. With active management strategies important to maximizing carbon storage, how does this willingness vary according to current management regimes of landowners? After answering these questions with descriptive quantitative mail survey data, results from qualitative analysis of landowner interviews are described to construct a more comprehensive typology of how all ecosystem services factor into management. How do landowners perceive the ecosystem services from their land? There are

inherent tradeoffs and synergies among different types of ecosystem services. With these tradeoffs and synergies in mind, is climate change mitigation really the opportunity forestry has been waiting for?

Chapter Four focuses on applying findings from the previous two chapters toward the development of effective management strategies. What forestry practices cater to contemporary forest landowners? An exploratory participant observation methodology was used in partnership with the Illinois Department of Natural Resources in central Illinois to assess the relationship between landowners and practitioners. The landowner emphasis upon amenities and cultural ecosystem services is highlighted as a major hurdle to effective management, but also as an unexplored avenue to engaging forest landowners with forestry practitioners. How can amenities and cultural ecosystem services be merged with ecologically sound management? The situation in central Illinois provides a glance at some encouraging opportunities for practitioners and researchers.

The conclusions found in Chapter Five suggest major policy and practice modifications. To mitigate current threats, address landowner needs, and reinvigorate the field of forestry, radical new paradigms are necessary. Fortunately, means and capacities to implement these changes exist, and a preliminary framework is constructed. The will to implement necessary changes may be the biggest challenge.

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## **Chapter 2 – Private Forest Management Actions within the Public-Private Ownership Patchwork of Southern Illinois**

### **Introduction**

Landowner engagement with forestry practitioners is closely associated with positive resource outcomes on private forestlands in the United States (Egan, 1999; Fischer & Ruseva, 2010; Kilgore, Greene, Jacobson, Straka, & Daniels, 2007). Yet, private landowner engagement with forestry practitioners is severely lacking. Nationwide, only 4% of family forest landowners have a written forest management plan, and only four times that many have sought professional management assistance from foresters or other forestry practitioners (Butler, 2006). The consequences of low levels of forestry practitioner-landowner engagement are three-fold.

First, with forestland loss rates to development surpassing one million acres per year (Stein et al., 2005), the lowest common denominator approach of just keeping forestland forested provides major impetus for practitioner-landowner engagement and revamped policy initiatives. Second, the increasing number of newer, smaller landowners electing passive stewardship strategies over active management activities compromises the ability to manage for a number of ecosystem services at broad scales (Best, 2002; Kilgore, 2004) and negates avenues to check a number of risks: invasive plant species (Epanchin-Niell et al., 2009; Steele, Chandran, Grafton, Huebner, & McGill, 2006; USDA Forest Service, 2004), climate change (Stavins and Richards, 2005; US EPA, 2005), or lost resilience of disturbance-dependent landscapes (Askins, 2001; Knoot, Schulte, & Rickenbach, 2010). Third, half of these landowners have harvested timber during their tenure (Butler & Leatherberry, 2004), but the logging practices used for many of these private forestland harvests is a major sustainability concern (Coufal, Wiedemann, & Greason, 2010; Fischer & Ruseva, 2010; Kenefic & Nyland, 2005; Smith, 2010).

Parallel to these concerns of development deforestation and ecological degradation on private forestlands, different battles have occurred on public forestlands. Very public battles accentuated by thousands of appeals and extensive litigation have drastically altered the face of the Forest Service over the last several decades. Only a few decades ago, the Forest Service was largely respected as an agency characterized by top-down, hierarchical decision making, albeit aimed at the one-dimensional goal of producing timber. The staff of this agency was dominated by foresters. Over time, foresters within the agency saw their influence decline as the bureaucracy struggled to manage for multiple conflicting environmental, social, and economic goals. Hull (2011) recently commented on the implications of this paradigm shift:

“Unfortunately, these public battles damaged the reputation of forest professionals and forest science, placing them on the wrong side of politically popular topics and narrowly defining Forestry as an advocate for corporate interests and commodity production (McQuillan, 1993; Hirt, 1996; Nelson, 2000)” (p. 51).

Hull’s (2011) commentary about the declining influence of forestry practitioners is just one of many during recent years. Luckert (2006) characterized the once powerful “omnipotent forester” (Behan, 1966) as now the “impotent forester.” Much of this discussion, however, failed to distinguish between the spheres of public and private forestry, instead illustrating a downward trajectory of the influence of forestry practitioners.

In this paper, an 11-county case study is used to study the private forest landowners’ actions at the intersection of these public and private domains of forestry in southern Illinois. In this region where national forest management and private forest management are spatially linked by fragmented ownerships, the actions of private forestland owners are studied. The relationship between private forest landowner actions and landowners’ perceptions of public forest management is studied as well. What management actions are landowners implementing and why do they own forestland? What factors influence actions on private forestlands? How do

these landowners view proximate public forestland management with its timber wars and conflict about recreation management? And how are actions on private forestlands related to these perceptions of public forest management?

First, the literature is reviewed to examine the status of private and public forest management and briefly examines the interrelationships between these two spheres. Expectations are summarized. Then, these expectations are adjusted to account for Illinois private forest policies and trends on the Shawnee National Forest. Results examine the actions of these landowners, why they own land, and what attitudes they hold about the Shawnee National Forest. Then, multivariate logistic regression modeling is used to analyze how reasons for owning land, Shawnee National Forest attitudes, and demographic variables influence the four actions on private forestlands. Finally, implications for private forestland management and policy are discussed.

## **Literature Review**

### *Private Forestlands*

Engagement of private forest landowners with forestry practitioners has been a long-standing concern for forestry researchers within the United States for a number of different reasons. Since the beginning of the 20<sup>th</sup> century, foresters have been unsuccessful at engaging more than a small fraction of these landowners. This disengagement has prompted concerns first about timber supply, then about quality of ecological management, and finally about development and parcelization. Still, few landowners have management plans or employ a forester to assist in management decisions.

The pioneer of American forestry, Gifford Pinchot, argued that mismanagement of private forestlands in the United States was drastic enough that intervention to prevent timber

famine was necessary (Pinchot, 1909). Landowners were decimating private forestlands with excessive logging but not practicing any sort of long-term management to sustain yields. This era of “rapid and wasteful harvesting” (Pinchot, 1909, p. 8) soon waned, but the perceived problem of timber supply did not.

Egan’s (1997) meta-analysis of private forest landowner research from the mid-1940s to 1997 provided a chronological frame to the development of private forestry and private forest landowner research. From the first half of this period, the primary focus of research was the problem of timber supply, even though research as early as 1949 indicated timber was not the sole aim of these landowners. Their inaction was influenced by nontimber forest values that forestry did not address. Mignery (1956) asked: “Why do some small landowners practice forestry while a great majority fail to do so” (Egan, 1997, p. 190)?

After the mid-1970s, research and policymakers’ aims slowly shifted to acknowledge nontimber values, and Egan (1997) concluded with a call to educate foresters about acknowledging the diverse objectives of private forest landowners and managing for ecosystem condition. Again, the focus of forestry research shifted. Since, researchers have transitioned to attempting to prevent the loss of private forestlands to parcelization and development (Best, 2002; Kittredge, 2009; Stein et al., 2005). Losses of more than one million acres per year to development (Stein et al., 2005) and scant participation in current forestry programs suggest private forestry is facing some major obstacles.

### *Engagement on Private Lands*

Literature on private lands provides a good deal of information about what factors influence management. Butler (2008) developed a profile of the private forest landowner through the National Woodland Owner Survey. Approximately 10.3 million “family” forest landowners



own 42% of U.S. forestlands—262 million acres (Butler, 2008). The vast majority of private forest landowners are located east of the Great Plains (Butler, 2008). In general, these landowners are older than the general population, and the mean age is increasing. Most live on or near their land and most also own less than 50 acres. About 50% have harvested trees for some purpose, but few own forestland for timber or firewood. Most commonly cited reasons for owning forestland in the recent National Owner Woodland Survey were “beauty/scenery”, “to protect nature and biological diversity”, “acreage is part of a farm or home site”, “for privacy”, and “to pass the land on to heirs” (Butler, 2008).

General demographics and forestland characteristics have often provided means to predict the actions of private forest landowners. Age of the landowner was often found to be positively correlated with conservation program participation (Baumgartner, Creighton, & Blatner, 2003; Baumgartner et al. 2003; Kaetzel, Hodges, Houston, & Fly, 2009; Nagubadi, McNamara, Hoover, & Mills, Jr., 1996) but negatively correlated with timber harvesting (Beach, Pattanayak, Yang, Murry, & Abt, 2005). Education was also found to be positively associated with conservation program participation, timber stand improvement, and timber harvesting (Baumgartner et al., 2003; Beach et al., 2005; Soule, Tegene, & Wiebe, 2000). Little empirical evidence was found linking agricultural producers to program participation or timber stand improvement. Some studies showed U.S. farmers more likely than non-farmers to harvest timber (Boyd, 1984; Hyberg & Holthausen, 1989), but one Finnish study found farmers less likely to harvest (Kuuluvainen & Salo, 1991). Acreage has often been found to be positively correlated with forest management actions because of the economies of scale in managing large parcels (Baumgartner et al., 2003; Beach et al., 2005; Nagubadi et al., 1996; Row, 1978; Thacher, Lee, & Schelhas, 1996). Low participation and action by absentee landowners has been a concern of

researchers (Finley & Kittredge, 2006; Shaffer & Meade, 1997), but absenteeism has not been shown to be a consistent variable across studies (Amacher, Conway, & Sullivan, 2003; Beach et al., 2005).

### *The Forest Service and National Forests*

In just a few decades, the Forest Service forester went from an employee of one of the most respected federal government agencies to a marginalized practitioner. The influence of the Forest Service forester peaked when World War II ushered in an era of sustainable timber production and demand for a profession still in its infancy in North America. The raw resources needed for the war effort and the accelerating post-war demand provided an opportunity to ramp up timber harvesting on federal lands through the mid-1960s (Bosworth & Brown, 2007).

In 1960, Kaufman's prominent study of the Forest Service depicted an agency of iconic administrative efficiency, albeit in its strong focus on the production of timber. Substantial barriers to efficient administration of public forestland existed, but Kaufman observed the agency continued to meet rising performance goals. Even by the time of publication of Kaufman's study, things were changing. Just a few years later, Behan (1966) offered ominous predictions of forestry's future when he warned of the pitfalls of ignoring society in favor of more technocratic decision-making structures. Already by this time, Behan acknowledged the divergent interests influencing forest management and the many interest groups and politics involved in forest management. Shortly after, the Forest Service found itself heavily influenced by a cascade of environmental legislation including the National Environmental Policy Act (1969) and the National Forest Management Act (1976).

This legislation essentially ended the era of Forest Service autonomy on national forests, instead ushering in an era of rigid, formal public participation processes prior to administrative

decisions (Germain et al., 2001) with appeals and litigation following administrative decisions (Coulombe, 2004; Jones & Taylor 1995; Keele, Malmsheimer, Floyd, & Perez, 2006). During this time, a great deal of agency change occurred as a result of efforts to meet legislative mandates (Jones & Taylor, 1995). A greater number of other resource professionals and scientists were integrated to meet requirements presented by new legislation (Tipple & Wellman, 1991), and the Forest Service workforce was diversified in order to better respond to public values (Brown & Harris, 1993). Although the Forest Service maintained high timber outputs through the 1980s and into the 1990s, the Forest Service transitioned into the business of restoration and recreation (Bosworth & Brown, 2007; Tipple & Wellman, 1991).

There is no shortage of concern about the viability of the current model of public forestry within the Forest Service as a result of decades of change (Fairfax, 2005; Hirt, 1994; Hull, 2011; Nelson, 2000; Sedjo, 2000). Luckert (2006) concluded that Behan's *Myth of the Omnipotent Forester* had become the *Reality of the Impotent Forester*. Hull (2011) cited the low morale within the Forest Service as further evidence of its decline while Brown, Squirrel, and Harris (2010) characterized the Forest Service as an agency "struggling to cope with its posttimber reality" (p. 77).

### *The Public-Private Interface*

The literature investigating phenomena on the public-private interface is concentrated on the cooperation among private landowners and public land managers in the western United States. Bergmann and Bliss (2004) offered an analysis of the social dynamics between public land managers and agricultural private landowners regarding fire management. Their Grant County, Oregon case study illustrated landowner frustration with public forest managers where cooperation was a key to forest restoration and wildfire risk management but also illustrated

forest manager frustrations within the ranks of the Forest Service about their inability to navigate bureaucratic obstacles (Bergmann & Bliss, 2004). The local decline of timber production and ranching on public lands and the shift to accommodate the interests of the nonlocal environmental groups had adversely affected trust among entities, and public forest managers found themselves struggling to balance competing interests (Bergmann & Bliss, 2004).

Brunson (1998) attributed a large part of public manager-private landowner relationships to the cultural history of private property rights. Landowners were much less willing to cooperate with public managers if private property rights were threatened, but this stance was mediated by the purpose of cooperation and trust of public managers (Brunson, 1998). The literature studying the relationships of these public forest managers and adjacent landowners is very limited.

The characteristics of landowners at the public-private interface have been undergoing substantial change for some time. Ecological concerns about urban and suburban development on this interface (Hansen et al., 2005) accentuate the changing demographics of this landscape from large agricultural landowners to smaller, more developed parcels owned by amenity migrants focused on quality of life (Knight & Clark, 1998). These amenity migrants differ substantially both demographically and ideologically from the previous generation of public-private interface landowners. The new landowners tend to be highly educated, affluent, older, and environmentally-concerned (Jones, Fly, Talley, & Cordell, 2003).

### **Conceptual Framework**

In this study and based on the extant literature, the majority of landowners were expected to favor nontimber objectives and most landowners were not expected to be actively managing (Butler, 2008). Landowner engagement was operationalized as four possible actions by landowners: having sought information from a forester, having obtained a written forest

management plan, having completed a commercial timber harvest, or having conducted timber stand improvement. The high emphasis on timber supply and production were expected to translate into higher engagement and action for timber-oriented, agricultural, and large acreage landowners while nontimber-oriented, smaller landowners, with other objectives were expected to be less engaged with practitioners. Age and education were expected to positively influence landowner engagement with practitioners while status as an absentee landowner was expected to negatively influence engagement. Like Bergmann and Bliss' 2004 case study, the conflict on public forestlands, distrust of the Forest Service, and the public dialogue regarding forestry was expected to impact the ability of practitioners to influence landowners' forest management actions. Landowners with unfavorable perceptions of the Forest Service were expected to be less likely to adopt the studied actions commonly suggested by practitioners.

## **Study Region**

### *Shawnee National Forest and Southern Illinois*

The historical context of the Shawnee National Forest is integral to illustrating the intertwined social dynamics of public forestland management and private forestland management. In the 1930s, the federal domain was expanded with the purchases of private lands increasingly marginal for farming or denuded by forestry practices. During the New Deal era, much of this public land was reforested, and infrastructural improvements were made. The Shawnee National Forest was officially designated in 1939. The forest grew to 185,000 acres by World War II and slowly added about 100,000 acres over the next 70 years (Soady, 1965). According to publicly available GIS data, the Shawnee National Forest measures 287,000 acres in an 11-county region that is approximately 2.4 million total acres. About 26% of forestland in the region is part of the Shawnee National Forest while the remainder is mostly privately-owned.

The fragmented landscape exhibits 1,901 linear miles of boundary between federal forestlands and other primarily private parcels. About 10% of the forest is designated wilderness, and approximately another 2% of the area had been studied and debated as a candidate for wilderness designation (USDA Forest Service, 2006). The remaining 88% was deemed too fragmented and interspersed with private lands to warrant consideration for wilderness designation.

The management of the Shawnee National Forest has been contentious at times. Recreation management and timber management were the two primary issues of contention during the most recent National Forest Management Act mandated planning process that concluded in 2006. The Forest Service transitioned from planning timber harvesting for income production in the 1986 and 1992 forest plans to planning and implementing minimal timber harvesting for ecological restoration in the 2006 forest plan (USDA Forest Service, 1986; USDA Forest Service, 1992; USDA Forest Service 2006). Since the conclusion of the 2006 planning process, timber management debates have been secondary to debates about horse trail-rider access. ATV/OHV use was indefinitely suspended from the forest by a court injunction (Sierra Club et al. v. United States Department of Agriculture, 1996) and currently awaits environmental analysis stipulated by the courts.

Welch and Evans (2003) characterized the relationship between multiple user groups and the Forest Service as a give-and-take relationship with the Forest Service unsuccessfully mediating a number of inherent conflicts among these interest groups. A number of stakeholders viewed Shawnee National Forest management unfavorably for different reasons: recreationists for threats to access; environmentalists for pro-use bias; and many long-time residents for economic effects of declining timber revenues. Many of the same stakeholders, however, perceived conflict existed not because of, but despite best efforts of local Forest Service

managers to negotiate the tangle of divergent interests and bureaucratic environmental analysis (Welch & Evans, 2003).

### *Illinois Forestry Policy and Practice*

Private forestland management decisions in the study region are made within the framework established by the 1983 Illinois Forest Development Act (IFDA). This private forestland conservation legislation provides substantial property tax incentives and cost-share assistance to woodland owners with an approved forest management plan with the explicit goal of timber production. The act established a 4% timber harvest tax to fund cost-sharing of forest management practices such as tree planting, timber stand improvement, and hiring a consultant to complete a forest management plan. Budget maneuvers have left this fund secondary to its federal cost-share program counterparts, and property tax incentives are the main benefits that landowners realize from this legislation.

There are few forestry practitioners to provide Illinois Forest Development Act management planning and requisite timber management services within the region. Only two Illinois Department of Natural Resources district foresters provide forestry assistance in the study region, and 8 consulting foresters list addresses within this region (IDNR, n.d.; Illinois Consulting Foresters, 2008), leaving a ratio of approximately 80,000 privately-owned, forested acres to each private forestry practitioner in the region.

In 2005, the Illinois Department of Revenue directed county assessors to reassess wooded property not enrolled in the Illinois Forest Development Act “according to its highest and best use” (Illinois Department of Revenue, 2005 p.1). This provoked considerable concern among landowners. Advocates of forestry immediately voiced concerns about the potential for rapid “conversion to cropland, hay production, pasture, and real estate development” and “immediate

and indiscriminate logging” (Illinois Forestry Association, 2007 p. 1). In 2007, the Illinois Conservation Stewardship Act was passed to provide tax relief for landowners seeking to maintain open and wild lands, but not intending to harvest timber as required by the Forest Development Act. Enrollments in either the 1983 Illinois Forest Development Act program for timber production or the 2007 Illinois Conservation Stewardship Act program provided avenues to conserve all forestlands without adverse impacts of high and best use taxation. Consulting a practitioner to produce a management plan was mandated by the Illinois Forest Development Act, but no similar requirement was included in the Illinois Conservation Stewardship Act. Shortly after the passage of the 2007 Illinois Conservation Stewardship Act, the following survey was conducted to assess landowner engagement with private and public forestry practitioners.

### **The Southern Illinois Conceptual Framework**

Scoping interviews with practitioners and landowners prior to the survey revealed a common perception that contrasted with the narrative about the national population. Unlike this population, many landowners were indeed actively managing their forestlands for timber and wildlife. State forest policy was expected to influence actions. The Illinois Forest Development Act provided substantial incentive for timber management. The Illinois Conservation Stewardship Act mitigated the risk of high taxes for nontimber-oriented forestland owners, but did not encourage specific management actions or landowner engagement of any sort with practitioners.

Previous research in the region highlighted a sometimes misunderstood relationship between landowners, public forestland managers, and private forest practitioners. One scoping interview with a private forestry practitioner characterized the relationship as follows:

“...95% of the time as forester, people assume that I work for the Forest Service. My aunt just asked me the other day if I work for the Forestry Service. That’s my



aunt. So I guess I probably distance myself a little bit and make an effort to tell people or educate people about the other things that foresters do because 95% of the public thinks that foresters are forest rangers that are driving around in a national forest and telling people to put out their campfire and counting songbirds.” (private forestry practitioner)

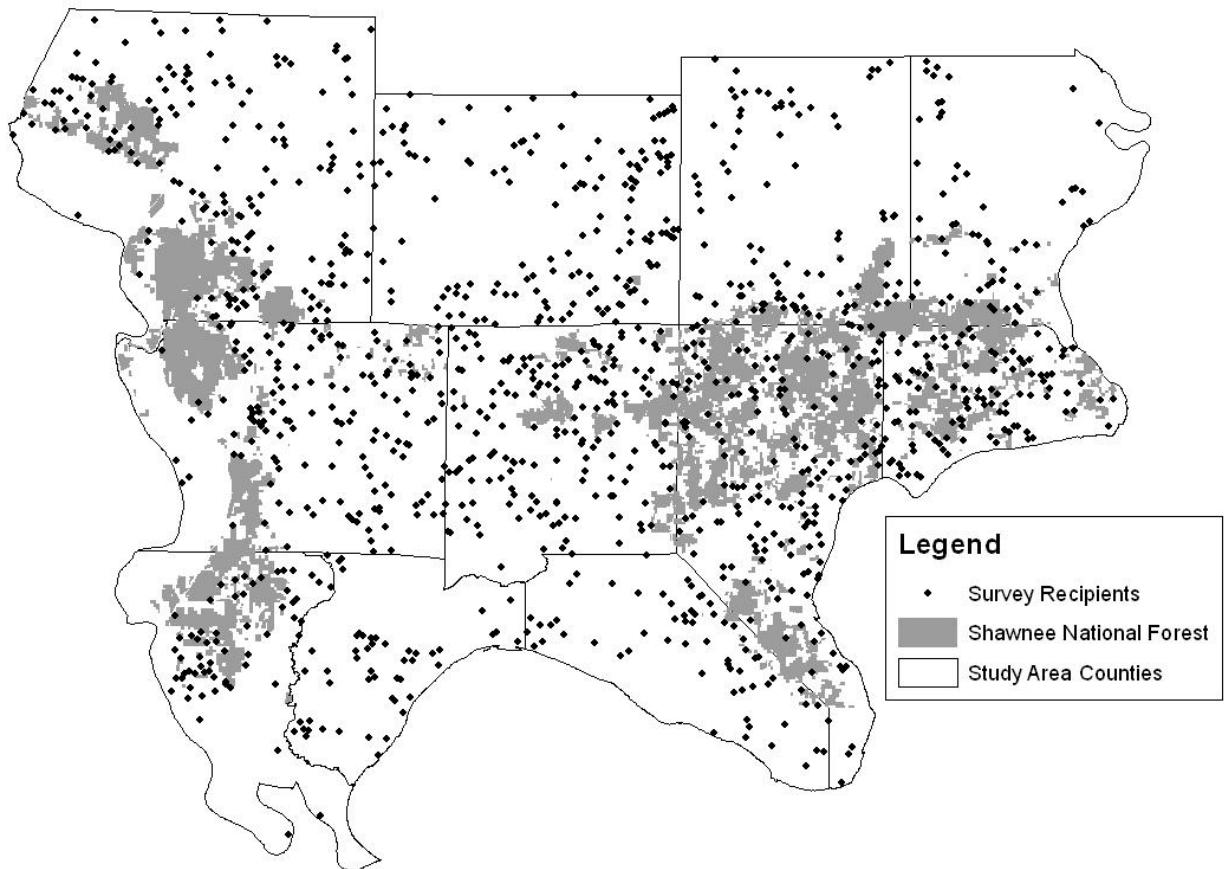
Paradoxically, this common misconception coincided with distrust of the Forest Service but the attitude commonly expressed by practitioners that private forestlands should be actively managed. In this paper, questions of what actions are occurring in the region and how landowners perceive their forest are asked. How are these actions and motivations related to the administration of the proximate and interspersed Shawnee National Forest?

## **Methods**

This paper utilizes data collected in a fall 2008 mail survey to 1200 landowners randomly selected spatially using the Hawth’s Tools random point generator extension for ArcGIS 9.1 (ESRI). The first 1200 unique landowners of 10 forested acres or greater who were selected by random points were included in the sample. Major industrial owners such as MeadWestvaco were excluded from this selection. Available records did not allow the consistent identification of landowners with less than 10 acres of forestland. Plat maps and county tax records were used to obtain contact information for landowners of selected parcels. Using this method, the probability of being selected was directly proportional to the size of forested property. The acreage distribution of respondents was compared to the resulting acreage distribution of the National Woodland Owner Survey (Butler, 2008). Larger landowners were likely overrepresented in this sample, while smaller landowners were likely underrepresented. Distribution of survey recipients throughout the region is illustrated in Figure 2.1. Further, nonresponse bias is a limitation here as

it is a constraint of most mail survey research (Groves, 2006), but minimized by the high response rate obtained.

**Figure 2.1 Map of Study Area and Sampling Methodology**



A thirty-two item questionnaire was mailed to landowners to assess landowner characteristics and demographics, attitudes about and actions on private forestland, and attitudes about the management and administration of the Shawnee National Forest. The survey instrument is included in Appendix A. Mail survey administration followed Dillman's (2007) Modified Tailored Design Method. An initial survey was followed up by a reminder postcard and a second wave of surveys to nonrespondents.

Survey data were analyzed with the SPSS statistical analysis package using univariate, bivariate, and multivariate techniques. Four actions were examined as the dependent variables of four different multivariate logistic regression models including: 1) having sought information from a forester; 2) having a written management plan; 3) having conducted a commercial timber harvest; and 4) having conducted timber stand improvement. Respondents were classified as having sought information from a forester if they listed either consulting forester or the Illinois Department of Natural Resources as a source of forest management information. They were classified as having a written management plan if they responded they had a written management plan completed by a consulting forester or an IDNR forester. Timber stand improvement denoted pre-commercial thinning in which the landowner expended money or labor, often with federal or state cost-share, to improve stand value, stand growth, and stand species composition.

These actions were examined in relationship to landowner reasons for owning land, Shawnee National Forest attitudes, and land characteristics and demographics variables. Landowners rated 11 reasons for owning land adapted from Butler (2008) on a 5-point Likert Scale. These variables included: beauty and scenery, wildlife habitat, financial investment, part of home, part of farm, privacy, pass land on to heirs, non-timber forest products, firewood production, timber production, and hunting.

In examining the 11 reasons for owning land measured, principal components analysis was used to classify landowners' reasons for owning land. The four variables of non-timber forest products, pass land to heirs, part of farm, and firewood production were removed from analysis for having communalities below 0.5. The two variables of part of home and hunting were removed for having complex structure indicated by loading on multiple components. The Likert Scale variables comprising these components were then averaged to create component

indices—respectively referred to as the amenity objectives index and the financial objectives index. The results of this analysis are detailed in the section below.

A 5-point Likert Scale variable about satisfaction with Shawnee National Forest management was included in the model. Adjacency was examined as well. Five attitudinal statements about the Shawnee National Forest were also examined but could not be included in logistic regression modeling because of multicollinearity. These included 5-point Likert Scale responses attitudes about timber, wilderness designation, horseback rider access, ATV access, and the role of environmental groups. These were also reduced using principal components analysis to one “multiple use” index. Results of this principal components analysis are described in the section below.

Demographic variables included in the model were age, whether the participant had completed a college degree, and whether they had ever been employed in agricultural production. Land characteristics examined in the model were acreage and whether the landowner was a resident landowner or not.

A multiple imputation technique (Rubin, 1987; Wayman, 2003) was used to replace missing values for logistic regression analysis. Replacement by multiple imputations provides an avenue to address missing data without greatly reducing sample size by listwise deletion and without reducing the variance of each variable by mean replacement. The multiple imputations created multiple imputed datasets where missing values were calculated by an imputation regression model with a large number of independent variables from the original survey dataset. This imputation model used existing relationships between these independent variables and the missing variable to replace missing values for analysis that better reflected the variability of missing data while retaining all cases for analysis. The logistic regression analysis of each of the

imputed datasets was pooled to derive the most representative coefficients. Pooled coefficients and accompanying odds ratios from five imputed datasets are presented in the results. Prediction tables in Appendix B reflect application of the logistic regression model to the original dataset.

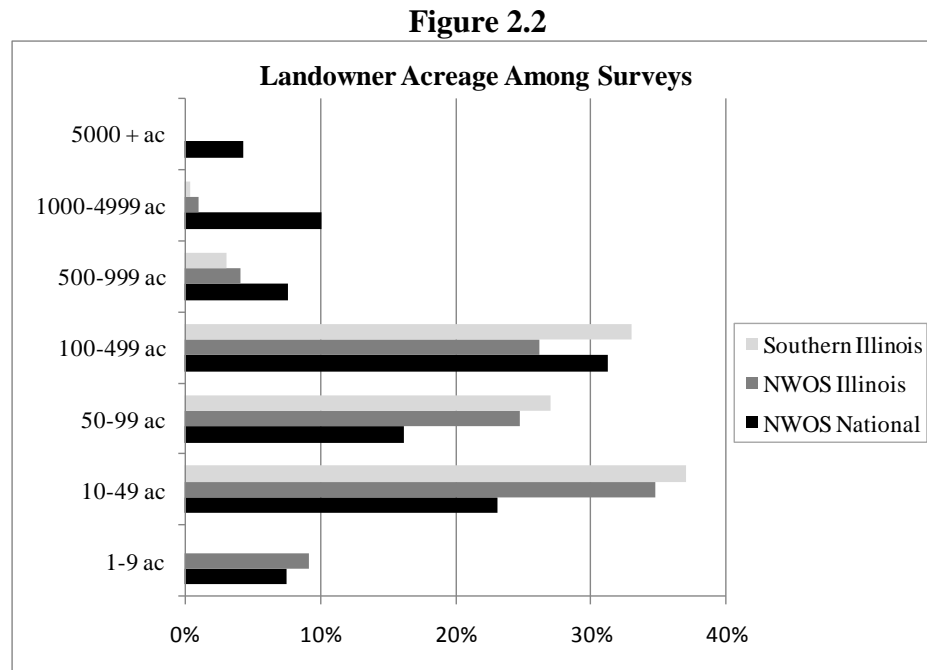
## **Results**

After accounting for 30 surveys returned as undeliverable and 72 as ineligible for failing to meet minimum acreage requirements, the survey response rate associated with receiving 532 eligible responses was 48.5%. Such a response rate is typical of forest landowner surveys and likely due to the enthusiasm landowners have toward their forestland (Butler and Tyrrell, 2008). However, nonresponse bias is still likely present, most notably the underrepresentation of less enthusiastic landowners who were less likely to respond. Of the sample of 1,200 landowners, over half (50.1%) were identified as owning land within 1 mile of federal land administered by the Forest Service. The response rate from these landowners within one mile was slightly higher with 53.6% of the sample comprised of landowners within one mile of the Shawnee National Forest.

### *Demographics and Land Characteristics*

Landowners ranged in age from 21 to 91 with a mean age of 62. Over four in 10 (41%) had at least a college degree. Resident landowners who owned forestland within one mile of their residence comprised 64% of the sample. At some time in their life, 59% of participants had been employed in agricultural production. Forested parcel sizes averaged 114 acres with a range from the minimum eligible parcel size of 10 acres to a high of 3,000 acres. The distribution of acreages among respondents demonstrated that parcels in this southern Illinois sample were substantially larger than the sizes of the National Woodland Owner survey sample. However, the

distribution of acreages resembled the Illinois National Woodland Owner Survey subsample. Results are presented in Figure 2.2.



### *Private Forestland Actions*

Of the four actions studied, landowners were most likely to have completed a commercial timber harvest (52.8%). They were almost equally likely to have sought information from a forester (50.6%). Just over one-third had completed timber stand improvement (35.8%) and under one-third had a forest management plan (30.2%). In each case, landowners with more acreage were significantly more likely to have completed the action. Results are presented in Table 2.1.

**Table 2.1 Private Forestland Actions**

Action	Percent Implemented (N=497)	Lowest Acreage Quintile / Highest Acreage Quintile
Forester as source of information	50.6%	36.9%/58.9% **
Forest management plan	30.2%	6%/48.9% ***
Commercial timber harvest	52.8%	32.3%/70.8% ***
Timber stand improvement	35.8%	17.0%/46.7% ***

\* =  $p \leq 0.05$ ; \*\* =  $p \leq 0.01$ ; \*\*\* =  $p \leq 0.001$

### *Reasons for Owning Forestland*

Among reasons for owning land, amenity enjoyment variables resonated across the spectrum of landowners for all sizes. Financial uses only resonated for some generally larger landowners. The largest acreage quintile was significantly more likely than the smallest acreage quintile to own land for timber production, financial investment, passing land to heirs, hunting, and part of farm. Overall, the reasons for owning land were favored in the following order by the percentage of participants who indicated either a four or five rating on a 5-point Likert Scale: wildlife habitat (80.1%) beauty and scenery (75.3%), privacy (67.0%), hunting (66.5%), pass land on to heirs (64.8%), part of farm (62.0%), part of home (59.7%), timber production (43.5%), financial investment (43.5%), firewood production (15.1%), non-timber forest products (11.3%). Further results are presented in Table 2.2.

**Table 2.2 Reasons for Owning Forestland  
from 1 = Not Important to 5 = Very Important**

<b>Reason for Owning Land</b>	<b>Mean (SD)</b>
Wildlife habitat	4.27 (1.04)
Beauty and scenery	4.11 (1.13)
Privacy	3.89 (1.39)
Pass land on to heirs	3.82 (1.41)
Hunting	3.78 (1.46)
Part of farm	3.62 (1.55)
Part of home	3.54 (1.61)
Financial investment	3.19 (1.42)
Timber production	3.04 (1.50)
Firewood production	2.15 (1.26)
Non-timber forest products	2.00 (1.22)

Among reasons for owning land, two components were identified from principal components analysis. Beauty and scenery, wildlife habitat, and privacy comprised an amenity objectives component (Cronbach's  $\alpha = 0.747$ ) and timber production and financial investment comprised a financial objectives component (Cronbach's  $\alpha = 0.666$ ). The means of these 5-Likert

Scale variables were then averaged to create component indices. These indices were used in bivariate and multivariate analyses. Results are presented in Table 2.3.

**Table 2.3 Principal Components Analysis: Reasons for Owning Forestland**

Reason for Owning Forestland	Components	
	1	2
Wildlife habitat	0.819	-0.055
Beauty and scenery	0.878	-0.066
Privacy	0.742	-0.021
Financial investment	0.180	0.849
Timber production	-0.039	0.870
<b>Eigenvalue</b>	<b>2.027</b>	<b>1.485</b>
<b>% Variance Explained</b>	<b>40.543</b>	<b>29.696</b>

#### *Shawnee National Forest Attitudes and Exposure*

Forty-two percent of respondents owned land directly adjacent to the Shawnee National Forest while 58% did not. Respondents were slightly unsatisfied as a whole, but generally ambivalent, about Shawnee National Forest issues. When asked to rate their satisfaction of Shawnee National Forest management, 21.7% expressed satisfaction with a response of four or five on a 5-point Likert Scale while 31.7% expressed dissatisfaction with a response of one or two on the 5-point scale. Almost half (46.6%) expressed neither satisfaction nor dissatisfaction with a response of three on the 5-point scale.

The two issues of contention identified in scoping interviews 2007 as the issues defining the debate about the Shawnee National Forest, horse trail-riding management and timber management elicited an even distribution of responses rather than the expected polarized distribution. On a 5-point Likert Scale, the respondents neither agreed nor disagreed with the need for increased timber management (34.5% agreed, 33.8% disagreed) and slightly supported more access for horseback riders (43.9% agreed, 27.3% disagreed). They slightly disagreed with the need for more wilderness designation (31.0% agreed, 42.6% disagreed). For each of the



preceding three hot-button issues, the distribution of responses clustered around the center rather than the extreme poles. Large majorities agreed that ATVs should continue to be banned from the forest (57.5% agreed, 25.3% disagreed) and that environmental groups should have less say in the management of the forest (59.5% agreed, 21.1% disagreed). These results are presented in Table 2.4.

**Table 2.4 Shawnee National Forest Attitudes on 5-point Likert Scale  
from 1 = Strongly disagree to 5 = Strongly agree**

<b>Shawnee National Forest Attitudinal Statements</b>	<b>Mean (SD)</b>
<i>SNF Statement 1: "I am satisfied with the management of the Shawnee NF"</i>	2.80 (1.09)
<i>SNF Statement 2: "More timber should be harvested from the Shawnee NF"</i>	3.02 (1.27)
<i>SNF Statement 3: "More wilderness should be designated in the Shawnee NF"</i>	2.80 (1.41)
<i>SNF Statement 4: "Horseback riders should be allowed more accessed in the Shawnee NF"</i>	3.31 (1.38)
<i>SNF Statement 5: Environmental groups should have less say in management of the Shawnee NF"</i>	3.72 (1.42)
<i>SNF Statement 6: "ATV riders should be allowed in the Shawnee NF"</i>	2.44 (1.49)

Principal components analysis reliably reduced these five attitudinal statements to one "multiple use component." The Shawnee wilderness designation variable was reverse coded and averaged with statements about Shawnee timber harvesting, horseback riding, environmental groups, and ATV access to create a multiple use index. The sample's multiple use index mean of 3.15 within a range from one to five indicated that this group of landowners as a whole was slightly in favor of more use and access for the Shawnee National Forest. Results are presented in Table 2.5.

**Table 2.5 Principal Components Analysis: Reasons for Owning Forestland**

	<b>Component</b>
	<b>1</b>
More timber should be harvested from the Shawnee NF.	0.621
More wilderness should be designated in the Shawnee NF.	-0.735
Horseback riders should be allowed more access in the Shawnee NF.	0.670
Environmental groups should have less say in management of the Shawnee NF.	0.748
ATV riders should be allowed in the Shawnee NF.	0.703
<b>Eigenvalue</b>	<b>2.427</b>
<b>% Variance Explained</b>	<b>48.531</b>

Very significant bivariate correlations among Shawnee National Forest Likert Scale variables illustrated sources of dissatisfaction about the management of the forest. Generally, those favoring wilderness designation were the most satisfied with Shawnee National Forest management. Those favoring active timber management and recreational access were generally less satisfied with management. Unfavorable opinions of environmental groups were also significantly and negatively correlated to satisfaction with management. Results are presented above in Table 2.6.

**Table 2.6 Shawnee National Forest Correlations between Attitudes and Satisfaction**

<b>Attitudinal Statements</b>	<b>Correlation with SNF Satisfaction</b>
More timber should be harvested from the Shawnee NF.	-0.214***
More wilderness should be designated in the Shawnee NF.	0.318***
Horseback riders should be allowed more access in the Shawnee NF.	-0.288***
Environmental groups should have less say in management of the Shawnee NF.	-0.134**
ATV riders should be allowed in the Shawnee NF.	-0.349***
<i>Multiple Use Index</i>	-0.370***
Values presented are Pearson R coefficients	
* = $p \leq 0.05$ , ** = $p \leq 0.01$ , and *** = $p \leq 0.001$	

### *Multivariate Analysis*

Binary logistic regression was used to assess the relationship of four forest management actions to hypothesized factors: 1) demographics and land characteristics; 2) financial and amenity reasons for owning land; and 3) perceptions of Shawnee National Forest management. None of these models were strongly predictive, but they did illustrate the effect of the independent variables upon the action of interest in relation to other independent variables.

Logistic regression seeks to predict a dichotomous dependent variable from a number of binary, continuous, or ordinal independent variables. A positive coefficient for an independent variable means that it has a positive effect upon the probability of occurrence of the dependent variable while a negative coefficient means the independent variable has a negative effect upon

probability of the dependent variable. This method also produces an odds ratio. An odds ratio of 1 would indicate that the independent variable has no effect upon the outcome. An odds ratio such as the 1.774 for the effect of the financial management index upon the probability of commercial timber harvest means that a 1-point difference in the financial management index between respondents means that the higher respondent is 1.774 times as likely as the lower landowner to have a commercial timber harvest. Variable coefficients and odds ratios for all four models are presented in Table 2.7. Prediction tables of each model are included in Appendix B.

Greater acreage was significantly associated with greater action in three of the models. Employment in agriculture was also significantly associated with implementation of timber stand improvement. A college education meant respondents were significantly more likely to seek

**Table 2.7 Logistic Regression Models**

	<b>Forester?</b>	<b>Plan?</b>	<b>Harvest?</b>	<b>TSI?</b>
<b>Age</b>	-0.006 (0.995)	-0.008 (0.993)	0.011 (1.011)	-0.002 (0.998)
<b>College Degree</b>	0.426* 1.539	0.431 (1.539)	-0.143 (0.867)	-0.004 (0.996)
<b>Ever employed in agriculture?</b>	0.214 (1.256)	0.405 (1.500)	0.276 (1.318)	0.503* (1.653)
<b>Forestland acres</b>	0.001 (1.0001)	0.004** (1.004)	0.004** (1.004)	0.003* (1.003)
<b>Resident Landowner?</b>	0.075 (1.063)	0.019 (1.019)	0.629* (1.875)	-0.002 (0.998)
<b>Financial Objectives Index</b>	0.196* (1.220)	0.354*** (1.425)	0.573*** (1.774)	0.376*** (1.456)
<b>Amenity Objectives Index</b>	0.285* (1.330)	0.154 (1.166)	-0.410*** (0.663)	0.369** (1.446)
<b>Satisfaction with SNF Management</b>	-0.023 (0.958)	-0.090 (0.914)	-0.057 (0.944)	-0.086 (0.917)
<b>Land Adjacent to SNF?</b>	-0.143 (0.837)	-0.495* (0.610)	-0.011 (0.989)	-0.542* (0.582)
<b>Constant</b>	-1.584	-2.449	-1.397	-3.276
<b>Model Chi-Square</b>	22.304**	50.565***	88.180***	48.904***

Odds ratios are presented in parentheses.  
 \* =  $p \leq 0.05$ , \*\* =  $p \leq 0.01$ , \*\*\*  $p \leq 0.001$

information from a forester. Resident landowners were significantly more likely to commercially harvest timber. Age was not a significant variable for any of the models.

The financial objectives were strong predictors of action in every case. A higher financial objectives index scores indicated participants with greater financial motivations were more likely to implement each of the four actions. Amenity objectives were also significant for three of these four models. A higher amenity objectives index score increased the probability of action for engaging a forester and for doing timber stand improvement but decreased the probability of commercial timber harvest. Amenity management goals were not significantly related to having a written plan.

Landowners adjacent to the Shawnee National Forest were significantly less likely to have a management plan or have done timber stand improvement. Satisfaction with Shawnee National Forest management was negatively related to all four actions but not strongly nor significantly.

## **Discussion**

### *Private Forest Landowner Actions*

The responses portrayed a sample of landowners more actively managing and engaging forestry practitioners than the greater U.S. population of private forest landowners. The implementation rate for different actions ranged from 30.2% to 50.6%. While results indicated a contingent of the population amenable to active forest management, they also indicated that a substantial and growing population of smaller acreage landowners was significantly less likely to actively manage in each of the four action categories.

### *Reasons for Owning Land*

Southern Illinois respondents' reasons for owning land did not differ substantially from the greater U.S. population. Amenity reasons for owning land were much more universally held than financial reasons for owning land. In southern Illinois, beauty/scenery and privacy were ranked as the 2<sup>nd</sup> and 3<sup>rd</sup> (of 11) top reasons for owning land, comparing similarly to ranking 1<sup>st</sup> and 3<sup>rd</sup> (of 12), respectively, among U.S. woodland owners (Butler, 2008). Financial investment and timber production ranked 8<sup>th</sup> and 9<sup>th</sup> (of 11) in southern Illinois, compared to land investment and timber production ranking 6<sup>th</sup> and 10<sup>th</sup> among counterparts in the greater U.S. (Butler, 2008). In both Illinois and U.S. survey samples, most landowners were interested in quality of life attributes, while only a certain subset also acknowledged pursuing more financial goals.

### *Shawnee National Forest Attitudes*

Landowners' attitudes were far more moderate than the conflict-laden Shawnee National Forest processes would indicate, supplementing other observations about the influence of the vocal minority and lack thereof by the silent majority (Davenport, Anderson, Leahy, & Jakes, 2007; Scardina, Mortimer, & Dudley, 2007). Three major issues on the Shawnee National Forest—timber, horse trail-riding, and wilderness designation—elicited surprisingly neutral response distributions. The correlations between issue-specific attitudes and general satisfaction painted a picture of passive management and interests of environmental groups at least being perceived as the most influential in Shawnee National Forest management.

### *Factors Related to Actions*

In exploring actions on private lands, demographics and land characteristics explained a good deal of action adoption. Acreage of the forested tract was an extremely important value in both bivariate and multivariate analysis and consistent with other findings about acreage

(Baumgartner et al., 2003; Butler, 2008; Nagubadi et al., 1996; Thacher et al., 1996). With decreasing parcel size from continuing exurbanization (Egan, 2000) and parcelization (Best, 2002; Zhang, Zhang, & Schelhas, 2005), addressing forest management at finer scales will become increasingly important. Even with acreage included as a variable in the analysis, the agriculture employment variable influenced the dependent action variables. Those who had been employed in agriculture at some point were more likely to do timber stand improvement, generally supporting previous findings in the U.S. (Beach et al., 2005; Boyd, 1984; Hyberg & Holthausen, 1989). College educated landowners' actions illustrated an increased willingness to seek information from practitioners, but they exhibited no more willingness to engage in on-the-ground silvicultural actions than those with less education.

The financial and amenity objectives indices provided insight into the effects of current strategies as well as possible opportunities for practitioners and policymakers. The financial motivations of landowners were very significant predictor variables of all four actions. Likely, this effect was especially pronounced because those managing for timber receive substantial incentives to obtain a management plan. Obtaining a management plan, in turn, oftentimes prompts the other three studied actions. Forestry practitioners were more effectively addressing the goals of financially oriented landowners, but these financial objectives were some of the least universally shared reasons for owning land.

An alternative way to interpret this result would be that of Salmon, Brunson, and Kuhns (2006). They attributed amenity landowners' aversion to management as a result of "lack of knowledge about forest management" (Salmon et al., 2006, p. 424). They suggested print and on-line publications that specifically address perceived risks of these amenity landowners such as scenic impacts of timber harvesting. This suggestion that amenity landowners are not interested

in active management was only partially supported by southern Illinois findings. Amenity landowners were significantly less likely to harvest timber, but they were also significantly more likely to implement timber stand improvement and seek information from a forestry practitioner. Salmon et al. (2006) addressed the challenge of addressing nontimber, non-amenity landowners, but this group only comprised fewer than 10% of the southern Illinois respondents.

Regardless of whether the relationship between reasons for owning land and actions was due to educational deficiencies of amenity landowners or the timber focus of the current Illinois Forest Development Act, the opportunity to provide and incentivize practitioner support to a broader audience exists within Illinois. The Illinois Forest Development Act has more effectively engaged a subset of landowners. With new threats to private forestland and little remaining concern about the 20<sup>th</sup> century preoccupation with timber supply, timber-focused policy becomes the agricultural subsidy that Kittredge (2009) decried as “quaint agriculturally oriented incentives from the 1950s” (p. 162). Of course, any policy attempt to engage new landowners with practitioners will have to address the concerns about impacts of active management with modified practices and adaptive practitioners.

#### *The Role of Public Lands and Public Forest Managers*

Have public land battles damaged the professionalism of forestry practitioners and defined foresters as sold out to commodity interest as Hull (2011) posited? The results of the logistic regression showed that attitudes and exposure to public land management were reflected in private management actions, but these relationships were not as the hypotheses suggested. The key hypothesized variable, satisfaction with Shawnee National Forest management, was not significantly related to any of the actions. Though not significant, satisfaction with public forest managers was inversely associated with all of the four actions. Landownership adjacent to the

Shawnee National Forest was negatively related to all actions, including two significantly. This could support the hypothesis that landowners most exposed to or most engaged with public forest management conflict were less engaged with practitioners. With the rapid demographic and ideological flux at the public-private interface (Knight & Clark, 1998; Rudzitis, 1999), it would be premature to conclude that the driving factor behind less engagement with practitioners and active management was exposure to Forest Service processes. However, cross-boundary cooperation in active management would be difficult in any attempts at landscape scale, mixed ownership management efforts.

## **Conclusion**

These landowners were not unlike the greater population of woodland owners in how they viewed their forestland: sometimes interested in timber and financial goals but nearly always interested in amenity goals. In comparison to the greater U.S. population of private forest landowner, they were quite actively managing their land and engaging forestry practitioners in this process. Negative perceptions of national forest management were expected to influence landowner actions. With more moderate perceptions of Shawnee National Forest management, there was not strong evidence to indicate that perceptions of Shawnee National Forest management processes strongly influenced actions on private land.

Not surprisingly, financial motivations were strong indicators of action on private forestland. This is reflected in the Illinois Forest Development Act that provides substantial benefit to forest management for timber production but not other forest management goals. Amenity objectives conflicted with the perceived impacts of timber harvesting but were actually positively correlated to seeking information from a forester and implementing timber stand improvement. The Illinois Conservation Stewardship Act provides protection from highest and



best use taxation, but provides no incentive to engage with practitioners despite the number of concerns that practitioners are able to address. Practitioners have the tools to address invasive species, high-grading, and climate change on private lands and could potentially better address development and parcelization. Amenities provide the universal currency for engagement. Turning research and policy focus to amenity management techniques will take advantage of what geographically varied private forest landowner research at multiple scales has been telling us for quite some time: timber is a legitimate goal for some landowners, but amenities are nearly universally enjoyed.

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## **Chapter 3 – Landowner Attitudes about Climate Change Mitigation in Relation to Other Ecosystem Services: a Southern Illinois Case Study**

### **Introduction**

The biophysical capacity to reduce greenhouse gases through carbon sequestration on forestlands is substantial. These forests provide potential for further carbon storage capacity and produce goods that are less carbon intensive than substitutes (Malmshiemer et al., 2008). Specific management regimes can capture these benefits. In the United States, nearly half of forestlands (42%) are owned by private “family” forest landowners (Butler, 2008). The actions of these landowners determine whether this stock is liquidated, maintained, or maximized. Knowing how these landowners will respond to initiatives to mitigate climate change is important to the success of emerging climate change initiatives.

Uncertainty about climate change is a dominant perspective in the U.S. The implications for mitigating the risks of climate change in privately owned forests are unclear. Forest management strategies for climate change mitigation may conflict with the goals of landowners. Research about these private forest landowners characterizes these landowners as a multi-faceted population largely unengaged with forestry practitioners. Few landowners implement written management plans. Most enjoy amenity values. Where do forest landowners stand on the subject of climate change and how is this perspective related to their current and future forest management actions?

Markets for the ecosystem service of carbon storage have been proposed and largely accepted by policymakers as the means to control global greenhouse gas concentrations. Recent U.S. legislative attempts to curb emissions have embraced this market-based approach. It is important to examine how landowners will respond to potential carbon markets.

This paper first examines the literature about applied forest management strategies for climate change mitigation before examining these techniques within the context of landowner goals and emerging carbon market schemes for private landowners. Then, literature about ecosystem services and payments for ecosystem services is examined more broadly, with a focus on the tradeoffs and synergies between carbon storage and other ecosystem services. A case study from southern Illinois is used to examine key issues.

The paper first quantitatively assesses landowners' perceptions of climate change and willingness to change management activities are examined against landowner management objectives and management actions these landowners have already implemented. Second, the paper qualitatively assesses how the ecosystem service of carbon storage fits into the existing array of ecosystem services that landowners produce and enjoy.

This examination of climate change attitudes and ecosystem service perceptions relies on a multi-phase, mixed methods research methodology. In the fall of 2008, a mail survey of private forest landowners in the region was conducted to explore climate change attitudes. In 2009, follow-up interviews were conducted with survey participants, reviewing a number of questions arising out of survey data analysis including ecosystem service perspectives.

## **Literature Review**

### *Forestry Climate Change Mitigation Strategies*

A number of active forest management practices can be implemented to maximize sequestration or replace emissions. The Society of American Foresters' Climate Change Task Force report (Malmsheimer et al., 2008), the Pacific Forest Trust's report on managing for carbon on U.S. private forestlands (Wayburn et al., 2007), and the Forest Guild's *Climate*

*Change, Carbon, and the Forests of the Northeast* report (Perschel, Evans, & Summers, 2007) all drew similar conclusions about forest management for climate change mitigation.

Keeping the forestland base intact is the most important component to maintaining current carbon storage levels. This means preventing development and parcelization of forestlands, especially in the northeastern U.S. (Perschel et al., 2007; Wayburn et al., 2007). It also means preventing agricultural conversion for purposes such as corn-based ethanol. In addition to minimizing forest loss, increasing the forestland base through afforestation is an effective means to maximize carbon storage potential (Malmshemer et al., 2008; Perschel et al., 2007; Wayburn et al., 2007).

These reports advocated the use of silviculture to increase rotation ages and stocking levels. A focus of these techniques should be to “concentrate growth on fewer, larger trees” (Perschel et al., 2007 p. 2). Most importantly, professional foresters should apply these practices because “high grading, whole tree harvesting on nutrient-impaired sites, liquidation cutting, and relying on short-term rotations” (Perschel et al., 2007 p. 35) are all common logging practices that decrease current carbon stocks and compromise the ability of the forest to sequester carbon in the future.

Each of these reports advocated the use of sustainable harvesting, biomass, and carbon credits to increase opportunity cost against the loss of forestland to other land uses. All three highlighted that wood is less carbon intensive than substitutes like steel. Wayburn et al. (2007) noted that biomass harvesting can be used to thin small-diameter growing stock, thus facilitating silvicultural objectives as well as financial objectives. A common theme among reports was the incentive that carbon credits will offer to forest managers to appropriately adjust management

regimes to maximize carbon storage (Malmshiemer et al., 2008; Perschel et al., 2007; Wayburn et al., 2007).

A third piece of the puzzle is the ability to maintain healthy, productive forests that sequester carbon at the fastest rate. To do this in the face of immediate climate change offers a further challenge. Malmshiemer et al. (2008) called attention to the contribution of wildfires to greenhouse gas emissions and suggested fuels treatments, prescribed fire, and biomass harvesting to alter wildfire contributions to the problem. Wayburn et al. (2007) predicted that climate change may increase the currently minimal fire risk in the Northeast. Wayburn et al. (2007) concluded that climate change mitigation and other environmental goals are linked and managing for “naturalness” is desirable for the purpose of climate change resilience but is also desirable for “habitats, biodiversity, and watershed function” (pg. v).

#### *Landowners and Climate Change Mitigation*

Even though methods to mitigate climate change with forests are well-established and will likely make sense to landowners financially, a century of work with private forest landowners has illustrated what may be possible from a technical standpoint may not be possible from a social standpoint. The forestry research community struggled with the issue of timber supply and timber management on private forestlands for 70 years before eventually accepting timber was not that important after all (Egan, 1997). Multiple avenues for climate change mitigation may exist on private forestlands, but experience with this question of timber supply on private forestlands illustrates that motivating the millions of forest landowners toward this common goal, even with financial incentives, may be difficult. In part because of private landowners’ hesitance to implement management practices, Butler, Ma, Kittredge, and Catanzaro (2010) concluded that the “social availability of wood” is much less than the “biophysical

availability of wood” on these private forestlands. Merchantable timber may exist in these small parcels but the motivations of these landowners and diseconomies of scale may make a substantial portion of it socially unavailable. Given the role of forest products and active management in proposed forestry strategies for climate change mitigation, can the social availability of climate change mitigation capacity be expected to differ appreciably from the social unavailability of wood?

### *Landowners and Carbon Markets*

Substantial incentives to landowners for maximizing carbon storage may become available via carbon markets. Carbon markets, utilizing the payments for ecosystem services model, have sprung up within the U.S. and around the globe. The payments for ecosystem services model incentivizes the production of public, previously non-market benefits like carbon storage. In the U.S., this model has been applied with substantial success to problems of water quality and quantity, wetland and habitat destruction, as well as climate change at multiple spatial scales (Deal, Raymond, Peterson, & Glick, 2010). This shift in thinking from more regulatory strategies such as endangered species conservation allows both increased revenues for private landowners and increased public benefit from the ecosystem services produced on private lands (Deal et al., 2010).

A number of econometric studies explore the feasibility and cost of sequestering carbon on private forestlands (Adams, Alig, McCart, Callway, & Winnett, 1999; Huang & Kronrad, 2001). Even with the encouraging results of these econometric studies, few landowners have bought into emerging carbon markets. In a case study of Massachusetts landowners, Fletcher, Kittredge Jr., and Stevens (2009) attributed low adoption to then-current carbon market prices, but they highlighted the fact that timber prices are often secondary to other factors such as

ownership objectives in decision-making. Fletcher et al. (2009) also highlighted that climate change management may, in fact, be an opportunity to engage a new set of landowners. A long history of research about landowner objectives and reasons for owning land indicates that there are tradeoffs among management strategies for different types of ecosystem services. Zhang, Zhang, and Schelhas (2005) attributed increasing parcelization and increasing demand for forested land to the comparative value of “non-timber forest products and environmental services” (p. 443) over timber production values. In essence, amenity values drive development.

#### *Millennium Ecosystem Assessment*

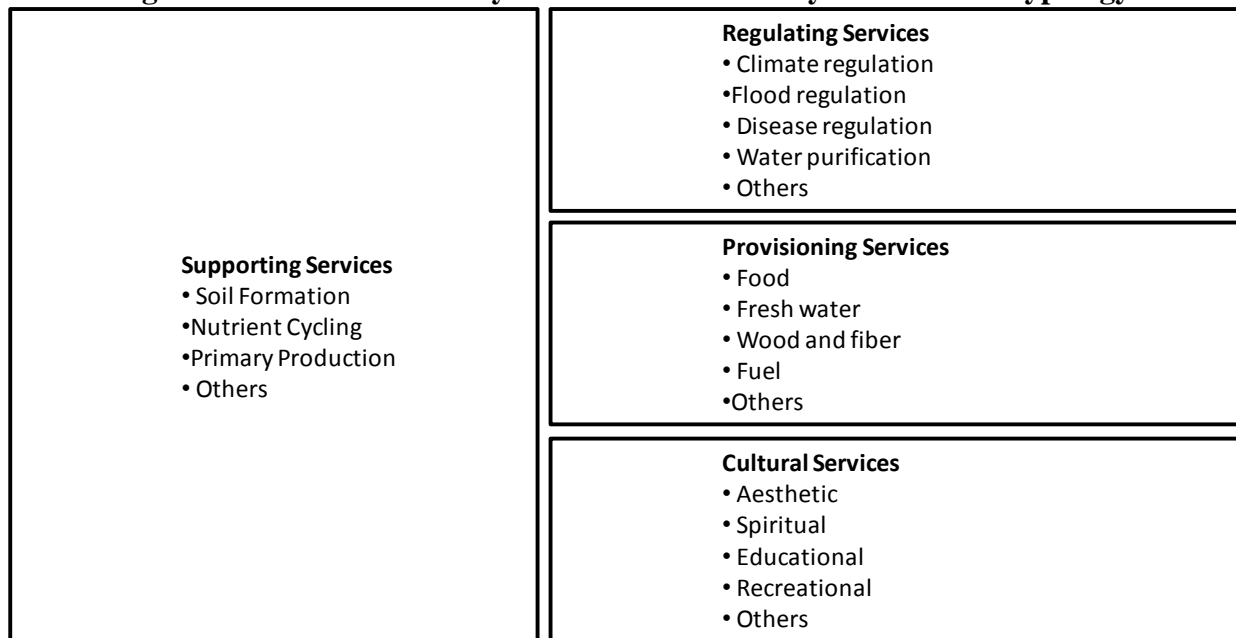
The Millenium Ecosystem Assessment (2005) categorized ecosystem services into four types: provisioning services such as food, freshwater, and wood; cultural ecosystem services such as aesthetic, spiritual, and educational services; regulating ecosystem services such as climate regulation, flood regulation, and disease regulation; and supporting ecosystem services such as nutrient cycling, soil formation, and primary production. This framework has been adopted by a number of scientists as a useful typology for conceptualizing ecosystem services. Figure 3.1 illustrates this typology.

#### *Synergies and Tradeoffs among Ecosystem Services*

Ecosystem services may conflict with each other, or they may reinforce one another. Accordingly, incentive-based systems often “bundle” services together when the production of multiple ecosystem services is synergistic (Engel, Pagiola, & Wunder, 2008). In their analysis of agricultural ecosystem service bundles in Quebec, Raudsepp-Hearne, Peterson, and Bennett (2010) found that provisioning ecosystem services often conflict with regulating and cultural ecosystem services. Nelson et al.(2009) found a synergistic relationship between provisioning



**Figure 3.1 Millennium Ecosystem Assessment Ecosystem Service Typology**



\* Figure adapted from Millennium Ecosystem Assessment Ecosystems and Human Well-Being Synthesis

ecosystem services and carbon but also highlighted synergies among the regulating ecosystem services of carbon sequestration and biodiversity conservation. In similar fashion, Rodriguez et al. (2006) exemplified this relationship by describing how forest management for the provisioning service of timber can negatively affect the ability of the land to provide the regulating service of water filtration and the cultural service of recreation. However, multiple analyses of forest management activities for carbon sequestration have found synergies between the provisioning ecosystem service of forest products and the regulating ecosystem service of carbon sequestration when silvicultural techniques are applied well (Deal et al., 2010; Malmsheimer et al., 2008; Perschel et al., 2007; Wayburn et al., 2007). Jack, Kousky, and Sims (2008) concluded that more research is necessary to examine relationships between ecosystem services markets and the tradeoffs and synergies among ecosystem services.

## **Conceptual Framework**

This paper examines the effect of forest landowner decision-making in the capacity to mitigate climate change on private lands. Specifically, the initial expectation was that attitudes about climate change and willingness to act would reflect the various degrees of uncertainty present within the general public. And it is also expected that some of these landowners would be inadvertently and haphazardly increasing carbon sequestration while the vast majority would be managing below potential because of perceived tradeoffs between active management and forestland management objectives. This paper then examines how these landowners make sense of the ecosystem services they and others enjoy from their land.

## **Study Region**

The study region for this analysis is the southern 11 counties of Illinois. The people of this mixed agricultural and forested region have a history whose livelihoods depend on the land. This history includes natural resource extraction from its coal mines and high-value hardwoods as well as diversified agricultural operations on oftentimes marginal land. This region is home to the approximately 270,000-acre Shawnee National Forest, but this only accounts for about 26% of forestland in the region (see Chapter Two). During the last few decades, the region has slowly assumed a new amenity-based identity associated with recreational and natural values. Timber harvesting from public forestland has nearly ended. Retirees and amenity migrants increasingly live on the land, own the land, and manage it for amenity values rather than financial values. However, agricultural landowners and others whose livelihoods depend at least in-part on the land, including timber production, are also a substantial portion of the landowner population. Socioeconomic indicators characterize the region as a high-poverty and low-income in comparison to state and national averages.

## Survey Methods

Survey recipients were selected using a random point generator for ArcGIS 9.1 (ESRI). Twelve hundred unique landowners from across the region were randomly selected using this method. Contact information was obtained for each of these landowners using the most recent available plat records and property tax information from local courthouses. Eight-page questionnaires with 32 questions were sent to landowners using Dillman's (2007) Modified Tailored Design Method. An initial mail survey was followed by a reminder postcard and a second wave of surveys to non-respondents. Survey data was analyzed using SPSS statistical analysis software emphasizing descriptive and bivariate statistics.

Because scoping interviews indicated that some participants did not define "climate change" as the warming of the climate due to the anthropogenic emissions of greenhouse gases, the survey referred to climate change as "global warming." Landowners were asked to define their attitudinal position on global warming and their willingness to act to mitigate global warming with and without compensation. Landowners were asked to choose one of five statements to describe their attitudinal position about global warming. Available options were: "Global warming is not occurring," "I am unsure that any global warming is occurring," "Global warming is occurring and is primarily due to human activities," "Global warming is occurring and is primarily due to natural causes," and "Global warming is occurring, but explanations are not well understood." Respondents were then asked to rate their willingness to act against global warming with four, 5-point Likert Scale statements from "strongly disagree" (1) to "strongly agree" (5). Respondents were asked to rate their willingness to alter current forest management practices or convert more land to forestland. They were also asked to rate willingness to do each of these actions either voluntarily or if compensated to do so.

Willingness to act against global warming was analyzed in relation to forest landowner objectives. Eleven objectives or “reasons for owning land” were rated on a 5-point Likert Scale from “not important” (1) to “very important” (5) and reduced to an amenity management index and a financial management index using principal components analysis as described in Chapter Two. An amenity index was comprised of four components: beauty and scenery, privacy, wildlife habitat, and part of home (Cronbach’s  $\alpha=0.744$ ). A financial management index was comprised of two components: timber production and financial investment (Cronbach’s  $\alpha=0.666$ ). The Cronbach’s alpha for the financial index components demonstrated unexpected divergence between variables, but they were still combined for analysis because of the logical relationship between financial investment and timber production. Scores of each index ranged from one to five according to the variables comprising each index, which were 5-point Likert Scale variables from “not important” (1) to “very important” (5).

Univariate statistics about perceptions of global warming willingness to act against global warming were analyzed. Then, a number of bivariate correlations examined to analyze the relationship between these variables. T-tests were run to compare differences in willingness to act against global warming and forest management objectives for the group of those who agreed with the idea that global warming is occurring and human-caused against the group of those who did not agree with this idea. Bivariate correlations were calculated for willingness to act against global warming and forestland management objectives. Past implementation of forest management actions was compared with the dichotomous perceptions of global warming variable with Chi-square analysis. Finally, t-tests were run to examine willingness to act against global warming for groups who had implemented each forest management action and who had not implemented each action.

## Results: Quantitative Analysis of Global Warming Attitudes and Willingness to Act

Of the original sample of 1200, 532 eligible landowners responded with completed mail surveys. Accounting for 30 returned as undeliverable and the 72 identified as ineligible, the final response rate was 48.5%.

### *Perceptions of Global Warming*

Surveyed landowners did not agree about the existence and causes of global warming. When asked to select one option among five that best described their view of global warming, only 29% indicated that global warming was occurring and primarily due to human activities. Respondents were split about the remaining four options which ranged from the statement that “Global warming is not occurring” (10.4%) to the more ambivalent view that “Global warming is occurring, but explanations are not well understood (26.1%). Full results are presented in Table 3.1.

**Table 3.1**

<b>Climate Change Attitudes</b>	<b>Percent</b>
1. Global warming is not occurring.	10.4
2. I am unsure that any global warming is occurring.	22.2
3. Global warming is occurring and is primarily due to human activities.	29.0
4. Global warming is occurring and is primarily due to natural causes.	12.4
5. Global warming is occurring, but explanations are not well understood.	26.1

### *Willingness to Act*

Few landowners indicated a willingness to act to mitigate global warming. Only 19% indicated they would voluntarily change forest management practices to address global warming, and 16% indicated they would convert more land to forestland to address global warming. Even including compensation, only 35% indicated willingness to change forest management practices and 30% indicated willingness to convert land. Results are presented in Table 3.2.

**Table 3.2**

<b>Willingness to Act Statement</b>	<b>Percent Agreed (4 or 5 of 5)</b>	<b>Percent Disagreed (1 or 2 of 5)</b>
I am willing to <u>voluntarily</u> alter my forest management practices to address global warming.	19.1%	51.5%
I would be willing to alter my forest management practices to address global warming <u>if compensated to do so</u> (i.e. carbon credits).	34.9%	36.5%
I am willing to <u>voluntarily</u> convert more of my land to forestland to address global warming.	16.4%	59.8%
I would be willing to convert more of my land to forestland to address global warming <u>if compensated to do so</u> (i.e. carbon credits).	30.1%	46.0%

Willingness to act to mitigate global warming through altering forest management practices or converting non-forested land to forest differed significantly among different attitudinal groups. Those who indicated that global warming is occurring and primarily due to human activities, were more likely than those with the other global warming perspectives to indicate willingness to alter forest management practices voluntarily (40.8% compared to 10.3%,  $t(414) = 9.071$ ,  $p < 0.001$ ), more likely to indicate willingness to alter forest management practices if compensated to do so (52.7% compared to 28.2%,  $t(415) = 6.204$ ,  $p < 0.001$ ), more likely to indicate willingness to convert more land to forestland (27.0% compared to 12.1%,  $t(402) = 6.399$ ,  $p < 0.001$ ), and more likely to indicate willingness to convert more land to forestland if compensated to do so (50.0% compared to 22.4%,  $t(401) = 6.785$ ,  $p < 0.001$ ).

#### *Forestland Objectives and Climate Change Mitigation*

Respondents with a higher amenity management index score as calculated in Chapter 2 were significantly more likely to believe that global warming is occurring and is primarily due to human activities ( $t(441) = 2.654$ ,  $p < 0.01$ ). Respondents with a higher financial management index score—those who favored timber production and financial investment as reasons for forestland ownership—were significantly less likely to believe that global warming is occurring

and is primarily due to human activities ( $t(420) = -2.208, p < 0.05$ ). In essence, those with high amenity index scores or low financial index scores were more likely to support the notion that humans were causing global warming than those who were not amenity-oriented or who were timber-oriented.

Forestland owner objectives were significantly and positively correlated with willingness to act to mitigate global warming in three cases. Landowners with higher scores on the amenity management index were more likely to favor both voluntarily altering forest management practices ( $r = 0.156, p = 0.001$ ) and voluntarily converting land to forestland ( $r = 0.167, p = 0.001$ ). This relationship was not significant when compensation was considered. The relationship between financial forestland objectives and willingness to act was not significant when considering voluntary adoption. Landowners with higher financial management index scores were significantly more likely to favor changing forest management practices when they were compensated to do so ( $r = 0.146, p = 0.003$ ) but not significantly more likely to convert more land to forestland when compensated to do so. Results are presented in Table 3.3.

**Table 3.3 Bivariate Correlations: Willingness to Act and Forest Landowner Objectives**

<b>Willingness to Act Statement</b>	<b>Amenity Management Index</b>	<b>Financial Management Index</b>
I am willing to <u>voluntarily</u> alter my forest management practices to address global warming.	0.156**	-0.017
I would be willing to alter my forest management practices to address global warming <u>if compensated to do so</u> (i.e. carbon credits).	0.071	0.146**
I am willing to <u>voluntarily</u> convert more of my land to forestland to address global warming.	0.167**	-0.081
I would be willing to convert more of my land to forestland to address global warming <u>if compensated to do so</u> (i.e. carbon credits).	0.072	0.073

\*\* =  $p < 0.01$  and \* =  $p < 0.05$ .

### *Landowner Actions and Climate Change Attitudes*

The perception that global warming is occurring and caused by humans was not significantly associated with the implementation of four studied forest management actions: seeking information from a forester, obtaining a written forest management plan, having a commercial timber harvest, or doing timber stand improvement. However, willingness to act against global warming was positively and significantly correlated with forest landowner actions in well-defined patterns. Those who had sought information from a forester, obtained a management plan, or done timber stand improvement were significantly more willing to act for three of the four scenarios: voluntarily alter management practices, alter management practices with compensation, and convert more land to forestland if compensated. Relationships between willingness to voluntarily convert more land to forestland were not so clear, except that those who had completed timber stand improvement were more willing to convert land voluntarily. Landowners who had harvested timber commercially were not significantly more or less likely to be willing to act. However, the general but not statistically significant trend was that landowners harvesting timber were less willing to act against global warming. Results are illustrated in Table 3.4.

Landowners who indicated they had harvested timber and sought information from a forester were more willing to change forest management practices voluntarily ( $t(212) = 3.115$ ,  $p = 0.002$ ) and change forest management practices when compensated to do so ( $t(215) = 2.155$ ,  $p = 0.032$ ) than their counterparts who had harvested timber but not sought information from a forester. Willingness to convert land was not significantly different among these two groups, however.



**Table 3.4 T-Test Results: Willingness to Act and Forest Landowner Actions**

<b>Willingness to Act Statement</b>	<b>Forester</b>	<b>Management plan</b>	<b>Timber harvest</b>	<b>Timber stand improvement</b>
I am willing to <u>voluntarily</u> alter my forest management practices to address global warming.	t(394) = 3.189 p=0.002	t(409) = 2.946 p = 0.003	t(427) = -0.972 p = 0.332	t(409) = 2.709 p = 0.007
I would be willing to alter my forest management practices to address global warming <u>if compensated to do so</u> (i.e. carbon credits).	t(397) = 3.225 p=0.001	t(410) = 3.205 p = 0.001	t(427) = 0.134 p = 0.894	t(408) = 3.593 p = 0.000
I am willing to <u>voluntarily</u> convert more of my land to forestland to address global warming.	t(385) = 1.639 p=0.102	t(397) = 1.483 p = 0.139	t(414) = -1.783 p = 0.075	t(394) = 2.227 p = 0.027
I would be willing to convert more of my land to forestland to address global warming <u>if compensated to do so</u> (i.e. carbon credits).	t(386) = 2.360 p=0.019	t(396) = 2.615 p = 0.009	t(413) = -0.380 p = 0.704	t(395) = 2.636 p = 0.009

## Interview Methods

With quantitative survey data about climate change attitudes in mind, qualitative results offer insights about the array of ecosystem services on these private lands. Given divergent attitudes and generally low willingness to act against climate change, how landowners classify the privately- and publicly-enjoyed benefits of their forestland is key to understanding possible synergistic management strategies.

Descriptive, univariate survey data were analyzed and compiled into a report for participants and other stakeholders. In early 2009, an internet link to the final survey results report and an invitation to participate in follow-up interviews was mailed to respondents whose address was within the study region. Of the 532 mail survey participants, 130 landowners were excluded because they were absentee landowners living outside of the region. Of the 402 who were identified as living within the study area, 66 indicated a willingness to participate with

further interviews. Fifty-three of these local participants were interviewed (52 in person and one by phone).

This paper focuses on these participants' responses to questions about how they classify ecosystem services from their land. In initial interviews, the concept of ecosystem services was defined for landowners, and landowners were asked to name and describe these services. This language proved to be problematic to landowners, so the approach was adjusted. As the process progressed, landowners were asked to name "what the land provided" to them to assess privately-enjoyed ecosystem services and to name "what the land provided" to the environment to assess publicly-enjoyed ecosystem services. Interview data were coded and analyzed using NVivo 7.0 (QSR International) for emergent themes about ecosystem services according to qualitative research methods established by Strauss and Corbin (2008). As the analysis matured, emergent concepts were abstracted to higher-level categories. A summary of categories and quotes that reflect each category are included in Appendix C.

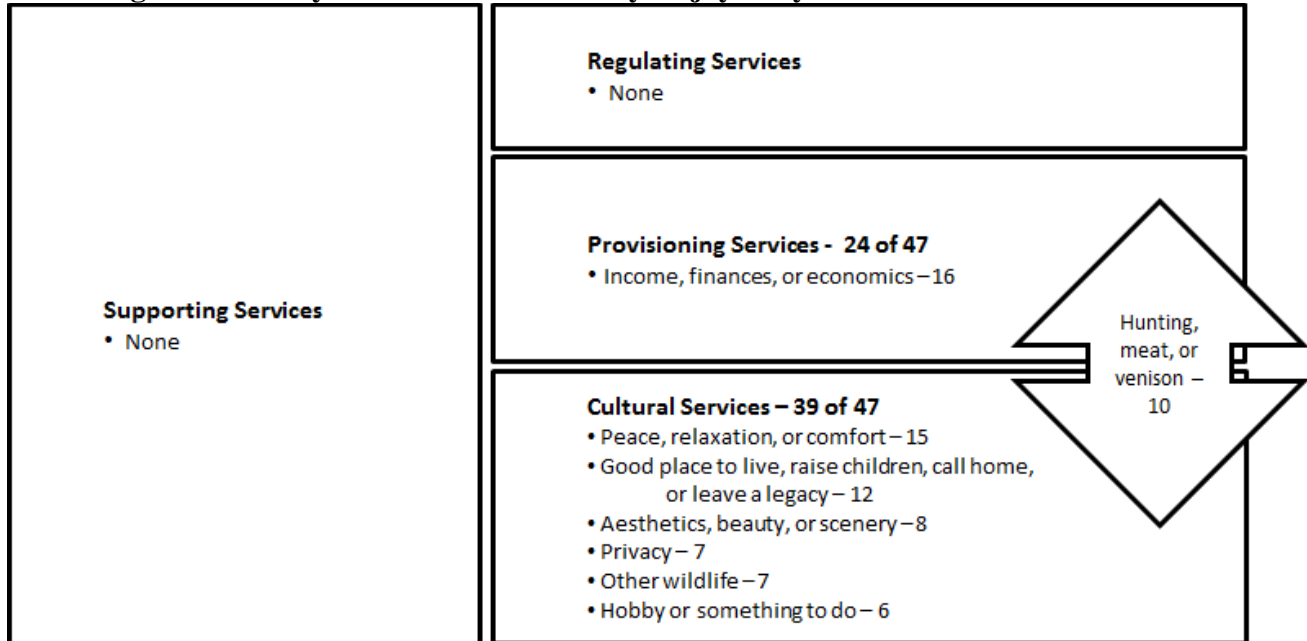
## **Results: Qualitative Results about Landowners' Ecosystem Service Classifications**

### *Privately-Enjoyed Ecosystem Services*

Forty-seven of the 53 participants identified ecosystem services—oftentimes multiple overlapping ecosystem services—accruing directly to themselves. Income, finances, and economics emerged at the top of the list of ecosystem services identified by 16 references. Peace, relaxation, and comfort emerged second with 15 participants citing these less consumptive benefits. Following behind these two categories were: good place to live, raise children, call home, or leave a legacy (12 participants); hunting, meat, or venison (10 participants); aesthetics, beauty, or scenery (8 participants); privacy (7 participants); wildlife value other than hunting (7 participants); hobby or something to do (6 participants); and a number of other assorted

ecosystem services only named by a handful of landowners. Figure 3.2 illustrates these results in the Millennium Ecosystem Assessment framework.

**Figure 3.2 Ecosystem Services Privately Enjoyed by Interviewed Landowners**



\* Figure adapted from Millennium Ecosystem Assessment Ecosystems and Human Well-Being Synthesis

*Income, finances, or economics* entered the conversation in a number of contexts. When explicitly delineated, some farm-forest landowners identified their agricultural component as the source of this ecosystem service. Many who identified income, finances, and economics were receiving Conservation Reserve Program (CRP) payments and had harvested timber at some point in the past. Few elaborated on how timber or CRP payments contributed to this service. Land as a rapidly appreciating asset was also a commonly cited component of this ecosystem service. The marginal agricultural land made anything more than minimal income generation difficult, but land appreciation provided a substantial buffer against financial difficulties.

The appreciation for the *peace of mind* or a low-stress lifestyle was common among interviewed landowners. Many spoke of peace as “peace of mind,” a term quite open to

interpretation. Contextually, they spoke of this service as an inherent attribute of the quiet, rural landscape. Only one spoke of peace of mind as security from risk:

“I’m gonna eat. I’m gonna survive. I’ve got two ponds on this place that are stocked very well with some nice fish. Even right now, we very rarely go to the store to buy meat.”

The others spoke about it as the “...serenity, peacefulness of the place...”, “...peace and quiet...”, as a “...peaceful place to be...”, or “...peace of mind. You’re grateful to the person who made this earth.”

*Good place to live, call home, raise children, or leave a legacy* was the most diffuse and widespread category. Each of these concepts became difficult to separate from the larger category. For instance, a good place to live and call home was very often closely associated with raising children on the land. When referring to children, the issue of leaving a legacy and how the future generation would follow the parents or grandparents in stewarding the same piece of land was integral to the dialogue.

The ecosystem service of *hunting, meat or venison*, has been an economic revenue generator for the region. Increasingly people are purchasing or leasing land in the region with this primary goal. For most or all interviewed, it was still a secondary goal of the landowner to hunt for sport or meat. During site visits, it was evident that people realized this service. Conservation programs such as the CRP, which have taken much land out of fencerow-to-fencerow agricultural production, were certainly a driver in the proliferation of hunted species. The financial component of these programs had been the dominant driver to ecosystem restoration in some situations, but oftentimes it was a byproduct of good management rather than a goal or driver of that management.

*Aesthetics, beauty, and scenery* were certainly mentioned but did not elicit much explanation from landowners. One or two words were enough in many cases: "...aesthetic values...", "...the scenery...", "...beauty and serenity...", "...aesthetic value...", "...beauty of the area...", or just simply "beauty." Eight landowners referred to this ecosystem service. Likely, it was taken for granted or assumed by others.

Landowners who cited *privacy* appreciated a place to get away from it all. It was no secret that they did not want to see their neighbors: "What's the saying? Good fences make good neighbors?" One was quite upfront about it. "I don't want some son of a bitch next door to me right looking in my window all the time." Another stated it more diplomatically: "Privacy is one of the big things for us. That's why we built out here [motioning to map] instead of over here."

The landowners who named *other wildlife* as an ecosystem service named it for reasons other than hunting. Other wildlife was treated as a separate category because of the non-consumptive connotations attached to it. Participants mentioned it in the context of aesthetics, beauty, or scenery; privacy; or peace, relaxation, or comfort. One landowner talked about taking pictures of wildlife. The others just liked to see it. One associated wildlife with privacy: "...sit out here and see the wildlife. Sit here and not have a neighbor staring..." From eagles and bobcats to deer and turkey, the wildlife was generally referred to as an asset. Nuisance wildlife, such as beavers and consequent flooding, subtracted from this value.

A small set of landowners mentioned the benefits of their forestland as a *hobby or something to do*. They simply derived satisfaction from managing their land. Though some others might have viewed this as a cost of ownership, this subset certainly viewed the time out on the land as a benefit of owning. The land provided them with enjoyment that they could find

elsewhere. With this in mind, they sometimes referred to this ecosystem service with smiles, laughs, and sarcasm:

“...150 head of cows. It’s a big hobby.”

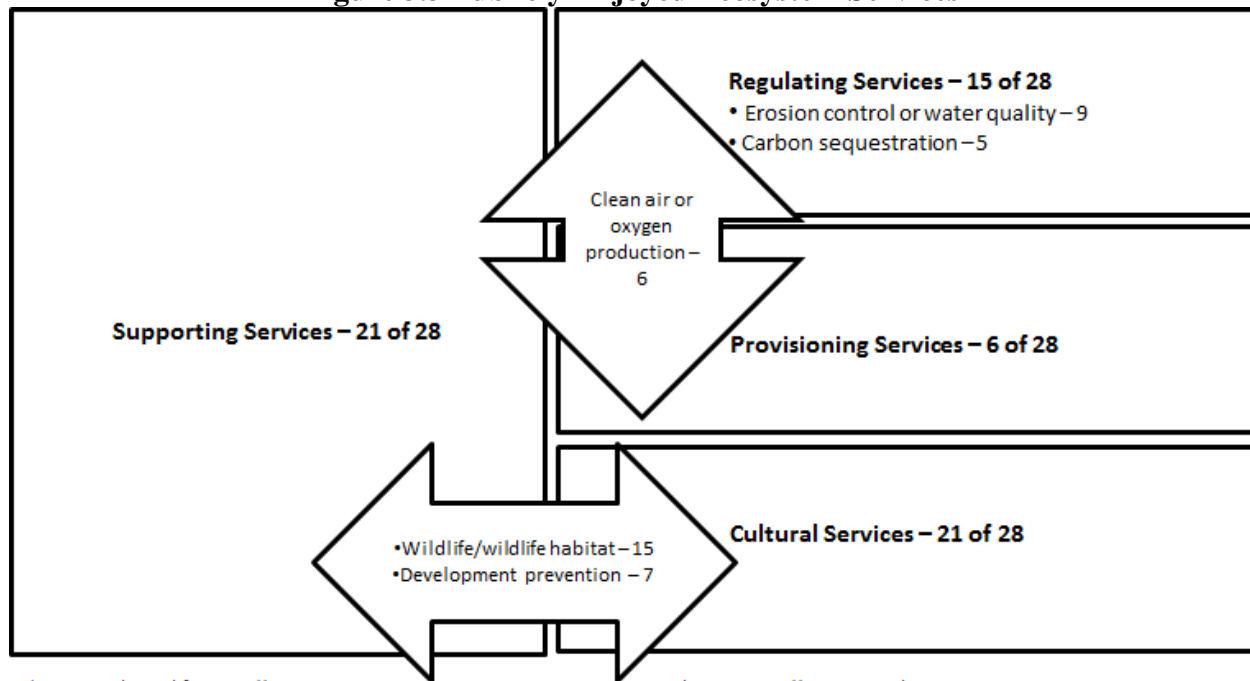
“Something to do [laughs] ... don’t see how I ever had time to work after I retired...”

Other coded categories were satisfaction of owning or link to the land; “nature”; ATVs or horse trail-riding; “country”; firewood; and freedom or independence. Few landowners referenced each of these categories, preventing further development of each of these categories.

### *Publicly-Enjoyed Ecosystem Services*

As noted above, not all of the 47 landowners who named ecosystem services were specifically prompted to name ecosystem services that benefitted the greater environment beyond their property boundaries. For the 19 landowners not prompted, only two mentioned the benefits of their land to the environment beyond their property. When thinking in terms of what their land provided and what benefits came from their land, landowners perceived those benefits staying within their property boundaries. Of the 28 landowners who were prompted to speak about the multiple benefits that their land provided to the environment or “publicly-enjoyed ecosystem services”, wildlife habitat (15 landowners – 54%) and erosion prevention or water quality (9 landowners – 32%) topped the list. Development prevention or “keeping the population down” (7 landowners – 25%), clean air or oxygen production (6 landowners – 21%), and carbon sequestration (5 landowners – 18%) were also in the mix. Results are presented in Figure 3.3.

**Figure 3.3 Publicly-Enjoyed Ecosystem Services**



\* Figure adapted from Millennium Ecosystem Assessment Ecosystems and Human Well-Being Synthesis

*Wildlife or wildlife* habitat was the most commonly cited environmental ecosystem service. It was also the most visible of these services. Wildlife were encountered on a \number of site visits across the region, and landowners frequently perceived hunting or other wildlife ecosystem services as ecosystem services for which they were willing to take time to plant food plots or otherwise manage their lands. Just as striking as the visible presence of wildlife was the ability to see the change in these populations—both positive and negative:

**Landowner:** “I think it provides great habitat for deer, and I remember the first wild deer I saw here in southern Illinois.”

**Interviewer:** “That’s probably a big deal?”

**Landowner:** “Big deal? [emphasis added] There wasn’t such a thing as deer around this country and we was down in land we owned south and it was in the spring time and we looked up and I can still see those three deer running across that field. And we all just stopped in awe. And I was a kid, I mean, this was 52, 53 years ago. We just stopped in awe and saw them deer and we talked to the game warden and he surmised that they come up from the Crab (Orchard) National Wildlife Refuge. I remember when there wasn’t a deer season. I remember when they started deer season, back when I was in high school...”

Another landowner referred to the decline in quail populations.

**Landowner:** “We mentioned the (loss of) quail. I think that’s another reason we lost our quail population. When I was a kid growing up in this area and learning to quail hunt, every farmer had a little patch of corn here, a little patch of beans here, and a little patch of something here—not big farms—and it was just ideal for quail and of course you could see with turkey, for instance, which were brought back into this country. It has expanded like crazy, but that’s because there’s habitat for them.”

Many participants were aware of their contribution to improving *erosion prevention and water quality*. They noted that the “creeks run pretty clear” and that they were “making sure that it isn’t washing off down the gullies”. The awareness of this service seemed influenced by CRP where a major focus had been placed upon highly erodible lands. A couple of interviewees used the “highly erodible” soil designation terminology of CRP when discussing the water quality or erosion prevention services that the vegetation on their lands provided.

Seven interviewees perceived their forestland as playing a role in *development prevention* and “*keeping the population down*.” These landowners were aware of the problem of development either as an environmental problem or as a quality of life threat:

“...there is so much construction going on all over the place, throughout the neighborhood. Any back road you turn on there is somebody building a new house or vineyard.”

“I see it all over. The woods is shrinking.”

They also recognized their role in the solution:

“I’m not selling lots. There’s already too many people everywhere.”

“...the fact that it’s kept natural which would be in trees, I think is helpful to the, well, worldwide environment.”

“Myself and neighbors—we’ve pretty much got all of this tied up although I did sell this off down the road. Broke it up.”



Additionally, six landowners referenced the ability of the ecosystem to provide *clean air and oxygen production*, and five landowners explicitly referred to the ecosystem's *carbon sequestration*. While neither category elicited substantial sample sizes, a couple of times it was not immediately clear if these landowners perceived much difference between addressing air quality and climate change. For example, one landowner connected this cycle of photosynthesis by noting the byproduct, oxygen, was a result of the sequestered input of carbon dioxide. More generally, interviewees recognized their contribution to air quality as “clean(ing) up a lot of air with the timber and the tree planting and the warm season grasses”, “filter(ing) the air”, and “purification” of air. They also perceived their lands as “put(ting) oxygen in the air”, their trees “producing oxygen”, and just letting “all my neighbors and you enjoy breathing.”

## **Discussion**

Survey results highlighted substantial obstacles to addressing climate change on private forestlands in southern Illinois. Further examination of interview data, however, yielded clues as to possible synergies between landowners' values and climate change mitigation targets. Effectively addressing climate change via private forestry may mean simply addressing common needs among landowners rather than targeting landowners with formal climate change initiatives. Or it may mean utilizing climate change to engage those who have historically not engaged in active resource management: amenity-oriented and nontimber-oriented landowners who were more likely to accept the idea of climate change and consequently more willing to act.

When given two options to mitigate climate change—changing forest management practices and converting more land to forestland—the majority of landowners were not willing to act. Willingness to convert land to forestland may have been deflated by the fact that many of

these landowners already owned a completely forested parcel. Each could have feasibly changed forest management practices, but few indicated willingness to do so. The possibility of compensation changed attitudes to some extent, but over one-third of surveyed landowners (36.5%) remained hesitant to change forest management practices while 46% indicated they would not convert land to forestland.

Perceptions of climate change were very important in predicting a landowners' willingness to change. Respondents who believed that global warming was occurring and due to human activities were four times more likely to indicate their willingness to voluntarily alter forest management practices. These same landowners were about twice as likely to indicate their willingness to change forest management practices if compensated or convert land voluntarily or if compensated. Until current landowner uncertainty about climate change origins and causes is resolved, widespread adoption of mitigation practices in this region will not be likely. If these practices are adopted, it will likely not be economically efficient.

Paradoxically, however, landowners most opposed to the idea of climate change exhibited management objectives most conducive to maximizing carbon storage while landowners most in agreement with climate change exhibited management objectives that conflicted with maximizing carbon storage. Reviews of forest management for climate change mitigation (Malsheimer et al., 2008; Perschel et al., 2007; Wayburn et al., 2007) emphasize the importance of active management techniques in sequestering carbon. Financially-oriented forest management requires active management, but these financially-oriented landowners were most opposed to the idea of anthropogenic climate change and climate change mitigation. On the other hand, landowners who were less financially-oriented were more likely to support the idea of anthropogenic climate change, but were less likely to be actively managing their forestland.

Forestry research emphasizes that active management in itself is not enough to maximize carbon storage. Researchers highlights the risk of destructive forest harvesting practices in liquidating carbon stores (Malsheimer et al., 2008; Perschel et al., 2007; Wayburn et al., 2007). This is especially concerning when a history of forest landowner research (e.g. Butler, 2008) indicates that, oftentimes, those who harvest do not utilize professional assistance in doing so. Consequently, the consensus among forestry researchers is that employing forestry professionals to apply specific management techniques is of the utmost importance for climate change mitigation (Malsheimer et al., 2008; Perschel et al., 2007; Wayburn et al., 2007). However, they also highlight that smart harvesting strategies associated with climate change mitigation is likely more financially lucrative than the prevalent use of diameter-limit cutting and high-grading (Malsheimer et al., 2008; Perschel et al., 2007; Wayburn et al., 2007).

Willingness to act varied according to financial and amenity objectives. Amenity management orientation was positively and significantly correlated to voluntary adoption of actions. Financial forest management objectives were positively, significantly correlated with the willingness to adopt new climate change friendly forest management activities, if compensation was available. Financial forest management objectives were not significantly related to willingness to convert land to forestland with compensation. Likely, this reflected that converted land would have to be removed from some other income-producing activity to earn income from afforestation.

The survey data portrayed the a strong majority of landowners as uncertain about climate change origins and landowners hesitant to change actions or adopt new actions aimed at addressing climate change. Paradoxically, landowners' management objectives were often in direct contradiction to their attitudes about climate change. Landowner actions paint a slightly

different picture. Those engaged with forestry practitioners—seeking information from practitioners, implementing a management plan, or doing timber stand improvement—were more willing to act against climate change. Each of these actions would feasibly be a proactive step in climate change mitigation management. This can be interpreted as those most concerned about the environment have already engaged with practitioners or alternatively, engaging landowners with these practitioners may be the first step toward climate change mitigation on private lands. Those harvesting timber for commercial purposes were not so likely to be willing to act, voluntarily or if compensated to do so, especially if they had not sought information from a forestry practitioner. In this case, getting foresters out on the land with these financially driven landowners to implement sustainable forestry practices already synergistic with climate change mitigation and landowners' financial objectives makes sense.

Better outcomes may simply require a more comprehensive reconciliation of climate change mitigation attitudes with financial management objectives as well as other management objectives. The ecosystem service framework was used to examine how landowners viewed the interrelated market and non-market outputs, and the public and private goods from their land. Interviews revealed that cultural ecosystem services were the most universally-appreciated and may be a worthwhile avenue to match large-scale climate change goals with forest landowner management objectives.

When thinking about publicly-enjoyed or “environmental” ecosystem services accruing from their land, few landowners highlighted the ability of their land to impact the climate change problem by sequestering carbon. Of the five who did highlight this ecosystem service, at least one expressed significant doubts about how the climate change and energy debate had been framed.

These landowners were very cognizant of environmental benefits of good land management. These ecosystem services of wildlife habitat, water quality, and air quality reflected much of the discourse established over the latter half of the 20<sup>th</sup> century with the Endangered Species Act, Clean Water Act, and Clean Air Act. A few landowners were beginning to perceive the threat of development and land parcelization and the impact upon the rural quality of life and environment. These environmental services were never mentioned in the context of being privately-enjoyed ecosystem services. Environmental ecosystem services were viewed as a result of good management more than a goal or intention.

Income, finances, or economics was the most cited ecosystem service by landowners, but fewer than half of all participants named this ecosystem service or another provisioning ecosystem service as a product of their land. Forest landowners named a wide array of cultural ecosystem services. In fact, 83% (39 of 47) named at least one of the cultural ecosystem services. Landowners were more concerned with spiritual values (e.g. peace of mind and relaxation), aesthetic values, heritage values (e.g. good place to raise children, leave a legacy), and recreational values (e.g. hunting), even though none of these provided more than minimal income. At the same time, a sizeable subset of landowners did not view monetary benefits from provisioning ecosystem services as mutually exclusive from the value of cultural ecosystem services. Forestry researchers highlight the synergies between the production of the provisioning ecosystem service of timber and the regulating ecosystem service of carbon storage. The connection between cultural ecosystem services and carbon storage is not so clear. Cultural ecosystem services of forests may drive development and parcelization thus decreasing carbon stores, but cultural ecosystem services also provide substantial impetus to retain carbon-rich forest landcover (Zhang et al., 2005). With the prevalence at which these landowners placed

value upon cultural ecosystem services, finding ways to merge cultural ecosystem service goals of landowners with climate change mitigation strategies for landowners will be key to the success of any initiative.

## **Conclusion**

This exploration of southern Illinois forest landowners makes two things clear. Forest landowners did not perceive climate change as a major threat; and forest landowner decision-making was closely tied to the enjoyment of cultural ecosystem services and not independent of the enjoyment of provisioning ecosystem services. With these two findings in mind, synergistic management strategies can be suggested to maximize production of the valued cultural and provisioning ecosystem services. and address climate change without alienating segments of the population.

### *Addressing Financial Objectives: Climate Change Mitigation and Timber are Compatible*

Active management of forestland promises sizeable benefits to the goal of climate climate mitigation. Some landowners enjoy the benefits of provisioning ecosystem services, such as income and financial benefits that result from the active management of forestlands. Survey data indicated landowners such as these may be positively influenced by financial incentives such as carbon credits. Survey data also indicated that these landowners were less opposed to climate change mitigation techniques, even though they were hesitant to agree with anthropogenic climate change arguments. Efforts to increase the use of forestry practitioners in forest management decisions should prevent destructive cutting practices and carbon liquidation while maximizing income. Proposed climate change strategies are compatible with financial goals, and they may prove effective at actually improving financial returns to financially-oriented landowners.

Another group of landowners highly value cultural ecosystem services. These are the landowners increasingly willing to pay thousands of dollars more per acre for forestland beyond timber production value. They perceive a risk that active management and cultural ecosystem services may be incompatible. These landowners are not likely to be strongly influenced by financial incentive schemes. At the same time, these landowners are also those most likely to agree with anthropogenic climate change and the most receptive to voluntary climate change mitigation measures. Climate change may be an avenue to engage these landowners. By researching, standardizing, and implementing active management strategies that have a low impact upon cultural ecosystem services, it will be much easier to initiate and sustain engagement with these landowners.

*Addressing Amenities: Cultural Ecosystem Services are Universal*

Cultural ecosystem services, including aesthetic, spiritual, recreational, and heritage values, contribute strongly to landowner decision-making. Large proportions of surveyed landowners and interviewed landowners indicated the importance of amenity values. Whether landowners view cultural ecosystem services and active management as compatible or incompatible, most will likely be receptive to a focus on cultural ecosystem service values. Policies and techniques that merge cultural ecosystem services and climate change mitigation will likely appeal to a wider group of landowners. A focus on low-impact applied forestry techniques to minimize cultural ecosystem service impacts coupled with a focus to preserve forestland via preservation mechanisms based upon cultural ecosystem service values, such as conservation easements, may prove to be a more realistic approach to climate change mitigation than compensation. Carbon credits may have some utility to incentivize financially-oriented landowners, but financial objectives are by no means universal.

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## **Chapter 4 – A Challenge to Researchers, Policymakers, and Practitioners: Incorporating Cultural Ecosystem Services into Private Forest Management in the Central Hardwoods Region.**

### **Introduction**

In 1965, a committee of the Illinois Technical Forestry Association mused about the “future of forestry” when they penned a few insightful lines in the closing pages of a long-forgotten silvicultural manual:

“The relative importance of forests for solid wood products is growing at a time when their contributions to Man’s enjoyment and spiritual needs are also increasing. Wood as a material product is abundant, but well-managed wooded, unspoiled, countryside and mountains suitable for the enjoyment of the millions is becoming scarce indeed...A population that is affluent, highly mobile, and increasing at an alarming rate will require new services from our forests and the best efforts of our foresters” (p. 34)

While their expectations of the market impact of forest products from Illinois woodlands may have been overinflated, these forward thinkers perceived the importance of aesthetic, recreational, cultural, and spiritual values and services of private forestland well before social scientists agreed on this notion. They further predicted that the “...practicing forester unable to meet the new challenges will soon be discredited and with him will be lost a segment of professional prestige slowly established over the decades” (p. 34). Nearly five decades later, a number of calls for change (e.g. Hull, 2011; Luckert, 2006) support the idea that the professional forester has indeed lost significant influence at the expense of the forest resource. Calls for change have done little to increase the relevance of forestry, including to private forest landowners.

During the middle of the 20<sup>th</sup> century, research about private forest landowners gradually came to the conclusion that these numerous, highly-valued nontimber goods and services were important to landowners after all (Egan, 1997). As early as 1965, the Illinois Technical Forest

Association authors concluded that applied forest management solutions “to promote opportunities for enjoyment by people” (p. 35) were possible. Still today, strategies to address nontimber goods and services are, at best, a patchwork of informal, haphazard adaptations to traditional silvicultural techniques. For example, foresters overwhelmingly favor single tree selection techniques in the Central Hardwoods Region for nontimber objectives, even though it has been well-established that there is a major tradeoff between single tree selection and the sustainability of oak-dominated ecosystems (Jenkins & Parker, 1998). While many volumes about traditional silviculture, timber management, forest biometrics, and forest products occupy practitioners’ shelves, methods and practices for management of nontimber goods and services are the footnotes and appendices to the current applied forestry literature, curricula, practice, and policy.

This paper draws from previous research findings in Illinois about how landowners perceived the relationships between different types of ecosystem services on their private forestlands (see Chapter Two and Chapter Three). The framework of ecosystem services, defined simply as “the benefits people obtain from ecosystems” (Millennium Ecosystem Assessment 2005, p. v) provides a means to holistically assess the market and non-market benefits of ecosystems and design appropriate policy interventions for efficient use of ecosystem services. A focus of this research was the role of the cultural ecosystem services which include “aesthetic enjoyment, recreation, artistic and spiritual fulfillment, and intellectual development” (Millennium Ecosystem Assessment 2005, p. 46). The findings highlighted the universally-enjoyed nature of cultural ecosystem services as well as the conflict between cultural ecosystem services and the active management for other ecosystem services including both timber and climate change mitigation.

This paper describes a case study conducted in east-central Illinois using a participant observation methodology. The author partnered with the Illinois Department of Natural Resources to provide forestry assistance to forest landowners in this region. This methodology was utilized to bridge the large disconnect between the findings of forestry social science research and the practice of applied forestry. With cultural ecosystem services so integral to landowner decision-making, how can the enjoyment of cultural ecosystem services be merged with the maximum production and enjoyment of a full array of other ecosystem services in practice? A preliminary framework resulting from this exploration is developed to include a number of cultural ecosystem service management techniques applicable to Illinois and the Central Hardwoods Region of the United States.

## **Literature Review**

For decades, surveys and studies of private landowners have indicated that these landowners increasingly value the intangible benefits such as beauty, scenery, nature, and privacy over the economic and financial benefits of forestland (e.g. Butler, 2008). Policy and technical management approaches have not appreciably changed over time, leading Kittredge (2009) to advocate refining the “quaint agriculturally oriented incentives” (p. 162) that fail to address contemporary threats.

The Millennium Ecosystem Assessment (2005) highlighted the interrelationships between human well-being and the environment via the concept of ecosystem services. The assessment operationalized this argument by typifying these ecosystem services into four categories: cultural ecosystem services, provisioning ecosystem services, regulating ecosystem services, and supporting ecosystem services. Economists highlight the value of using the ecosystem services concept to more fully incorporate market signals in environmental decision-

making (Boyd & Banzhaf, 2007). Policy that fails to recognize the values of many non-market services leads to output levels that are not environmentally optimal (Boyd & Banzhaf, 2007; Costanza et al., 1997). More specifically, the prioritization of provisioning ecosystems services such as food, water, and timber most often occurs at the expense of the other types of ecosystem services (Carpenter et al., 2009).

Although little research about private forest landowners in the United State has been conducted using the ecosystem services framework, much of this work can be easily translated. An important component of translating past work into the ecosystem services framework is the role of cultural ecosystem services. Previous work highlights that it is exactly these cultural ecosystem services that landowners value most. The National Woodland Owner Survey found that the top reasons for owning land were aesthetics, passing land to heirs, and privacy (Butler, 2008). Nature protection rounded out the list of the top four reasons for owning forestland (Butler, 2008). Zhang, Zhang, and Schelhas (2005) attributed the increasing parcelization of forestland ownerships and its ecological consequences to the high values of non-timber products and services. As stated in Chapter Three, research in Illinois demonstrated that cultural ecosystem services were enjoyed by a large proportion of private forest landowners.

The forestry research community has not ignored these cultural ecosystem services. Research showing that the landowners are not particularly interested in the ecosystem service of timber and are rather interested in ecosystem services like aesthetics, wildlife, and privacy resulted in calls for change. Jones, Luloff, and Finley (1995) called on private forestry practitioners to “reexamine both our audiences and our messages” (p. 44). Bliss (1994) more directly advocated foresters dedicate “less time defending unpopular practices and more time demonstrating practices which satisfy silvicultural and environmental goals in socially

acceptable ways” (Jones et al., 1995 p. 44). More recent arguments likewise emphasized the importance of listening to the concerns of the public rather than dictating forest management goals in order to maintain the relevance of the profession (Luckert, 2006).

## **Methods**

The participant observation methodology is employed to immerse the researcher in “everyday life situations and settings” from an insider’s perspective (Jorgensen, 1989 p. 23). This allows a unique perspective into everyday interaction as well as the meaning attached to that interaction that more positivistic methodologies struggle to comprehend (Jorgensen, 1989). The participant observation methodology was utilized in this case study to examine opportunities to incorporate social science research into applied forestry practice. As is characteristic of participant observation research, the results are both descriptive and exploratory. A new approach to addressing cultural ecosystem services through private forest management is proposed.

To accomplish these objectives, a partnership was established with the Illinois Department of Natural Resources’ (IDNR) Forest Resources Division. The lead author collected data in his role as district forestry intern between January and August of 2010. Forestry technical assistance, including initial site visits, forest management planning, timber sale administration, timber stand improvement support, and help with Farm Bill program administration was provided to private landowners in a 13-county forestry district in east-central Illinois. Forestry assistance was provided in the field by the lead researcher with an IDNR district forester or independently in close coordination with IDNR officials.

IDNR forestry assistance was provided within the context of the Illinois Forest Development Act (IFDA). This act provides current-use taxation and minimally-funded cost-

share incentives for enrolled landowners. Landowners must have a written forest management plan that explicitly states a primary goal of ownership is timber production in order to qualify for IFDA benefits. Most IDNR assistance site visits are directed toward IFDA-enrolled landowners or potential enrollees.

A standardized research protocol document was developed to document a number of factors that have been empirically studied to influence landowners' management actions, response to practitioner interactions, and ecological characteristics of forestland. What did landowners plan to do after the assistance visit? How was this influenced by seeking professional assistance? Was the forest species composition and presence or absence of invasive species related to past management actions? How would ecological characteristics change according to adoption of suggested techniques? Documented factors theorized to influence landowners' actions included acreage, management goals and objectives, land tenure, relationships with peer landowners, past management actions, forest certification status, and federal and state program participation. Demographic factors such as affluence, age, gender were also documented when possible.

This research protocol document was completed for each landowner who consented to participate following steps approved by the university human subjects review board. A debriefing reaction was also written by the author or audio-recorded and transcribed after each visit. Verbatim quotes of these debriefings are described in results. A research journal was kept throughout the project to document informal interactions and technical assistance that did not require direct person-to-person interaction. Interactions between the lead author and private landowners were not audio-recorded.



Participants were recruited in two primary ways. First, some participants contacted IDNR requesting forestry assistance; these 15 landowners were assisted as usual in the course of daily IDNR activities and were asked if they would consent to participate in research related to the site visits. These landowners were primarily current and new IFDA program participants. Second, additional participants were recruited specifically for the purposes of this research project.

Private forest landowners in Piatt, Champaign, and Vermilion Counties in east-central Illinois were contacted with the opportunity to receive forestry assistance and to participate in this research project. Seventy-eight private forest landowners with greater than 10 acres of forestland were identified in the following four USGS-designated hydrologic unit code (HUC) 12 watersheds: Lake of the Woods-Sangamon River, Spring Lake-Sangamon River, Archie Creek-Little Vermilion River, Fairview Drain-Little Vermilion River. All 78 landowners were contacted, and 17 elected to participate in the project. Site visits were conducted with each participating landowner, and formal forest management plans were prepared for 11 of these landowners.

## **Results**

Forest landowner participants in this study typically owned relatively small acreages. Nine of the 32 owned greater than 50 acres, but none owned more than 100 acres. Twenty landowners lived on their forested parcel. Twenty landowners were estimated to be over the age of 50, 11 were estimated under the age of 50, and one was not estimated. Very few resided more than a 1-hour drive from their forestland. Twenty-five landowners received agricultural income from their properties, but only three were full-time agricultural producers. The remaining 22 landowners relied on part-time agricultural employment or land rent income, including Cropland Reserve Program income. Landowners assisted were primarily males (25 of 32), but four couples

and three females participated. There were appreciable differences in forestland objectives among landowners who contacted IDNR for forestry assistance and those who were contacted to participate in this study. Because most of the 17 contacted landowners had not been in previous contact with IDNR, most were not IFDA participants and were not focused on the IFDA-defined objective of timber production. Those engaged with IDNR were more likely to be timber-oriented. Three of 15 IDNR-engaged participants described timber as the primary goal of forest management, but only two of these landowners were skeptical of timber production as a management objective at all.

Managing these small woodlands in central Illinois brought up the ever-present conflict between timber and cultural ecosystem services. Cultural ecosystem services such as aesthetics, solitude, wildlife, and the cultural aspects of hunting were highly valued by most. Participants occupied a widely distributed continuum of views about the compatibility or conflict between timber and cultural ecosystem services. In essence, landowners frequently deliberated, verbally and nonverbally, about a common concern as to whether forestry would “trash” the woods. Field notes taken about one landowner reflect the conflict between active management and cultural ecosystem services.

*When talking about timber, he referenced a harvest down the road from him where the timber company told him they were an ecologically sound outfit (no clearcutting), but he wasn't impressed. He said that “conservative” is the way he acts in timber management....After going on for a bit longer, he said: “No timbering as long as I'm alive.” (Field Notes)*

A few landowners, especially among those already working with IDNR, viewed their trees as a crop. There was a strong caution expressed, however, when referring to trees as a crop. The owners of this large, intensive agricultural operation had amassed an impressive volume per acre of white oak timber with patience and caution:

*(The landowners) were farmers - farmers concerned in maintaining a sustainable resource through very conservative management. (Field Notes)*

However, even among these more production-based views of forestry, landowners expressed significant hesitation at the idea of harvesting timber because of the risk of negative impacts:

*When I asked goals for the property, they zoomed right in on timber. Not that they wanted to harvest timber, rather it was something that they don't want to do but realize that they should. To paraphrase (the landowner): "I don't want there to be a lot of removal, but I realize that we should." They really enjoyed owning the property, and any sort of financial benefit from anything but the farm was the last thing on their minds. (Field Notes)*

In the disturbance-dependent, oak-dominated forests of Illinois, restoring or maintaining oak regeneration was difficult unless financial motivations factored into management decisions:

*(The landowner) and (wife) were the typical anti-disturbance landowners. When talking about the property, they owned for pleasure and wildlife (and firewood), they talked about management in terms of "maintaining" it. When walking the upland part of the property, it was apparent the oaks would eventually die and be gone forever, but I could not bring myself to suggest (practices aimed at) bringing back the oaks. Only after this did (the landowner) mention that somebody had been trying to buy his walnut—which I would later find a few MASSIVE veneer quality walnuts along the bottom. He said his main concern with harvest was tearing up his steep road (sic). Plus, he said money was not a huge issue. (Field Notes)*

Many landowners did not perceive value in engaging a forestry practitioner, even though they were receptive to ecosystem restoration practices and in at least four cases, more permanent measures such as conservation easements. The following field notes describe a landowner who later re-initiated contact regarding invasive species management. These field notes could have come from a number of landowners:

*(The landowner) and his wife were historically underserved forest landowners. They were affluent, white, and interested in enjoying their land but were either 1) not convinced that a forester was necessary for their management style or 2) not aware of services available through the state to walk the land with them. (Field Notes)*

## **Applying a Cultural Ecosystem Service Approach to Private Forest Management**

Whether to or how to consider cultural ecosystem services in private forest management, or forest management in general, is debated. Hull, Robertson, Buhyoff, and Kendra (2000) argued that use of the visual buffer strip to preserve aesthetics was a way of hiding good forestry. After describing the theoretical foundations of human preferences for nature that exhibits the absence of people and disturbance, they then concluded that rather than meet that demand, forestry must take “a leadership role in shaping public tastes” (Hull et al., 2000 p. 38). A number of researchers have discounted this knowledge deficit model of forestry and identified it as a key public relations problem for forestry (Behan, 1966; Bliss, 1994; Jones et al., 1995; Luckert, 2006). In proposing the following model of incorporating cultural ecosystem services, the latter perspective is adopted. Good forestry is responding to landowner needs rather than shaping landowner needs.

To meet landowner needs, cultural ecosystem services must be the first consideration in applied management. The value of cultural ecosystem services to landowners greatly exceeds timber production values. Whether cultural ecosystem services and timber production are viewed by the landowner as reinforcing or competing objectives, the best management of forests cannot discount cultural ecosystem services.

A review of the literature during this project revealed a number of well-established techniques in disciplines other than applied forestry to mitigate cultural ecosystem service impacts and increase the enjoyment of cultural ecosystem services. Within applied forestry, any comprehensive or standardized approach to this set of ecosystem services is absent. Field practitioners have made informal adaptations that can be expanded upon.

The practitioner's position at the epicenter of decision-making provides three key opportunities to utilize cultural ecosystem service based management in assuring the long-term sustainability of private forestlands. First, aesthetics and a long history of forest aesthetics research build the foundation to cultural ecosystem services management. It is possible that landowners have an accurate understanding of what management activities look like before they occur. In the case of the disturbance-dependent, oak-dominated ecosystems in Illinois, management for scarce oak regeneration can be coupled with management for aesthetics with little compromise. Second, the equally long history of natural interpretation study as well as forest recreation research offer techniques that can be employed to provide effective consultation tailored to the needs of landowners. Third, the relatively new application of conservation easements and other intergenerational land transfer techniques have been discussed as a means to preserve environmental values, but these techniques are equally adept at preserving heritage values that landowner may value equally or more. Creating a long-term legacy that does not affect the character of management is as simple as working with a forestry practitioner who embraces these techniques.

#### *Aesthetic Management Techniques*

An extensive literature addresses incorporating aesthetics in multiple-use forest management. Ribe (1989) summarized decades of empirical work on forest scenery in a few short clauses:

“...big trees are attractive, moderately stocked more open stands are preferred, ground slash and other evidence of harvests are disliked, ground vegetation enhances forest scenes, evidence of fire detracts from beauty, and species variety can enhance the same” (p. 70).

Although Ribe suggested that these findings were intuitive, they nonetheless provide a basic guideline for practitioners based upon a wealth of empirical data. However, much of this

perceived beauty is culturally and individually subjective (Ribe, 1989). In applying this to individual assistance on private forestlands, recognizing these principles is important. These guidelines imply that uneven-aged management, thinning, a focus on diversity, and forest slash treatments would be perceived positively while fire and more intensive treatments advocated by silviculturists would be less likely to be perceived positively by landowners.

The application of more thorough aesthetics management techniques is possible, however. Field adoption of elements of early techniques such as Daniel and Boster's (1976) Scenic Beauty Estimation Method or newer visualization techniques could prove valuable. Assessing landowner perceptions with examples of silvicultural treatments using geographically-specific, randomly sampled images would presumably alter both practitioner effectiveness and landowner actions.

Computer-based forest visualization techniques are advancing very quickly although a number of hurdles remain to widespread field deployment of these techniques (Wang, Song, Chen, Crow, & LaCroix, 2006). Current programs are able to construct visualizations at the stand scale and the landscape scale to predict future conditions or re-construct past conditions (Wang et al., 2006). The ability to preview a plan before it happens (Sheppard & Harshaw, 2001) will be a powerful tool for practitioners as the technology develops.

Stoltman, Radeloff, and Mladenoff (2004) discussed an example of putting computer-based visualization techniques in the hands of practitioners. They predicted that the adoption of these techniques will be analogous to the adoption of GIS techniques (Stoltman et al., 2004). Applying aesthetic management techniques will likely require interdisciplinary collaboration and training with landscape architects in a similar fashion to the collaboration and training with geographers required to educate the recent influx of GIS-proficient forestry graduates.

The following example about oak silviculture in the study region outlines the role and possibilities of aesthetics management. Practitioners and researchers have already recognized landowner demand for aesthetics. Yet, goals of oak restoration and aesthetics can be more seamlessly merged to meet landowner demands and ecological functions.

#### *Aesthetics in Oak Silviculture: A Regionally Specific Example*

One of the most pressing ecological issues of the Central Hardwoods Region has been identified as the loss of the disturbance-dependent, oak-dominated forest to a forest dominated by shade tolerant, disturbance-intolerant species (Groninger & Long, 2008). Forestry practitioners have identified the loss of oak-dominated forests as not only problematic for timber production, but also problematic for ecological values and considerations (Groninger & Long, 2008). McShea et al. (2007) noted the ability of oak-dominated forests to provide a premium food source for a variety of wildlife and characterized forest management in private forests as “one of the more important tasks facing wildlife professionals” (p. 1717). Even though the scientific consensus is that the use of single-tree selection silvicultural systems reduce the competitiveness of oak in this region, it is the system most often employed (Jenkins & Parker, 1998), presumably as a best attempt to respond to landowner and public demands to preserve cultural ecosystem services. Ozier, Groninger, and Ruffner (2006) predicted this selection system will eventually result in “landscape-wide loss of keystone species” (p. 267). In fact, Ozier et al. (2006) grouped this selective harvesting technique practiced by foresters as an equivalent to high-grading in its inability to maintain historic species composition.

The widespread use of the single tree selection system to minimize aesthetic impacts poses an interesting ethical dilemma for practitioners. Arguments for avenues to merge cultural ecosystem service management and oak silviculture have come from leading oak silviculturists.

Loftis (2004) advocated the use of specific “two-age methods” rather than more intensive harvesting solely to “satisfy nontimber objectives” (p. 166). Although he did not advocate the use of single tree selection systems for oak, he highlighted one case where single tree selection on xeric sites was successful (Lowenstein, 1996) and one case where midstory and understory treatments were key variables in improving the chance of success of a single tree selection management regime (Della-Bianca & Beck 1985; Lewis, Groninger, & Loftis, 2006). Further evidence suggested that retaining up to 85% of overstory in a first harvest in combination with understory treatments might be successful in spurring oak regeneration and recruitment (Dey & Parker 1996; Lorimer, Chapman, & Lambert, 1994; Pubanz & Lorimer 1992). Although Dey and Parker (1996) advocated a fairly intensive final overstory harvest, they also highlighted that “maintenance of a high forest canopy may provide aesthetic benefits in areas where visual quality is a concern” (p. 43).

In their primer on oak management in the Driftless Area, Jacobs and Wray (1992) acknowledged the challenge of managing for oak and aesthetics. They stopped short of discussing single tree selection systems with considerations for regeneration. But they did highlight the ability to reduce impacts through less intensive overstory harvest techniques. More importantly, they listed five steps for general aesthetic management in oak silviculture: 1) Minimize evidence of logging; 2) (Visually) screen clearcuts; 3) Avoid straight borders; 4) Leave snags and scattered trees; and 5) Deliberately create vistas.

### *Interpretation and Recreation*

In studying the effect of financial incentive programs, Kilgore, Greene, Jacobson, Straka, and Daniels (2007) found landowners highly value something as basic as access to a forestry practitioner to “walk the land” (p. 184) with them. This desire puts the practitioner in as much of



a natural resource interpreter role as a forester role. Natural resource interpretation caters to the public's desire for educational, recreational, and inspirational individual benefits (Knudson, Cable, & Beck, 1995). Textbooks have been developed to educate natural resource professionals about natural resource interpretation (e.g. Knudson et al., 1995; Tilden & Craig, 2007). A few key points from this wide-ranging literature can be directly applied to the private forest landowner context.

Tilden and Craig (2007) laid out six principles of effective interpretation. Among these are the ability to engage a target's existing interest rather than creating new interest, to interpret rather than inform, and to provoke rather than to instruct (Tilden & Craig, 2007). Altogether, the goal is revealing "something of the beauty and wonder, the inspiration and spiritual meaning that lie behind what the visitor can with his senses perceive" (Tilden & Craig, 2007 p. 25). Translated to forestry, a practitioner with a working knowledge and interpretation of showy wildflowers or wildlife habits would likely engage a wider range of landowners more effectively than a timber volume and value-focused forestry practitioner.

Among the wealth of techniques available to transform natural curiosity into an experience for the target group, Jacobson (2009) discussed the art of the guided walk—a technique analogous to what forestry practitioners informally practice each day with private landowners. Jacobson (2009) emphasized the importance of an "entertaining, relevant, meaningful" (p. 338) talk that is focused on a few main take-home points. Most information will be quickly forgotten, and a disorganized focus may detract from the interaction. Complexities must be addressed, but the initial hike through the woods may be a better opportunity to inspire deeper wonder and commitment to the woodland rather than droning on about silvicultural prescriptions.

Beyond interpretation as a recreational endeavor, the literature on forest recreation focuses on public recreation and visitor management (Douglass, 2000) and does not offer many possibilities about how to integrate this into management specifically on private forestlands. Research indicates that recreation is a primary reason for owning land, and many landowners enjoy forest recreation from hunting to horseback riding. Recreation management can be managed like aesthetics by first studying which areas users recreate in and then spatially altering management plans to suit this cultural ecosystem service. Pukkala, Nuutinen, and Kangas (1995) developed a model to maximize overall utility when considering timber, aesthetic, and recreational outputs together. Using recreational values that were empirically determined from a sample of users (Pukkala, Kellomaki, & Mustonen, 1988), they were able to examine the effect of three different management scenarios to maximize the recreational and amenity outputs and thus, overall utility. Adjusting spatial management patterns over time to minimize the impacts to forest recreation sites and aesthetics was effective at differentiating total utility among these three systems.

#### *Conservation Easements and Long-Term Private Forestland Planning Mechanisms*

De Groot and Ramakrishnan (2005) stated: “sustainable cultural landscapes should offer both high heritage values and (relatively) stable ecosystem functions” (p. 461) in advocating the importance of cultural benefits from nature. Further, they highlighted the role of mechanisms to preserve these cultural landscapes (De Groot & Ramakrishnan, 2005). The role of intergenerational planning mechanisms to preserve the cultural and ecological value of the private forest landscape in the U.S. (USDA Forest Service, n.d.) has been increasingly advocated (e.g. Broderick, Hadden, & Heninger, 1994; Majumbar, Laband, Teeter, & Butler, 2009; Tyson & Broderick 1999). Chief among these is the increasingly widespread use of conservation

easements to prevent development and parcelization of forestlands (D'Amato, Catanzaro, Damery, Kittredge, & Ferrare, 2010; Fairfax, Gwin, King, Raymond, & Watt, 2005; Rissman et al., 2007).

While forestry practitioners interact with landowners on a daily basis, long-term estate planning is neither a focus of current outreach and assistance efforts nor a proficiency developed in forestry training. In the context of forestry land use change, Butler et al. (2007) stated that foresters “are good at communicating with the family forest owners they know and interact with regularly” (p. 348). But even among this group, long-term protections are rare to non-existent in many areas. Interactions with central Illinois forest landowners illustrated that even for this sometimes sensitive issue, there was substantial willingness to act, given the opportunity. The conservation easement mechanism is aimed to preserve biodiversity and prevent development. It is designed to be flexible enough to be compatible with landowner goals, including the perpetuation of a working landscape (Rissman et al., 2007). With this in mind, the conservation easement and other planning mechanisms provide just one more avenue to preserve and maximize cultural ecosystem services compatible with current commonly-used private forestry practices and likely ought to be a part of a balanced approach by forestry practitioners desiring increased relevance.

## **Conclusion**

While recognition within the forestry community certainly exists about the importance of cultural ecosystem services in management, these services are often haphazardly addressed in comparison to other environmental services and timber products. Because most landowners prioritize and enjoy cultural ecosystem services, any attempt to restore and preserve these ecosystems that ignores these values will be marginally effective, if at all.

This example of administering applied forestry assistance in the central United States accentuates the need to adjust applied forestry techniques to landowners' needs. The call to inform and educate landowners is common in the history of forestry research. This approach has not resulted in widespread engagement of landowners with forestry practitioners. Opposing calls to discard this knowledge deficit model have likewise not resulted in widespread engagement of landowners. On-the-ground, applied techniques are necessary to acknowledge the needs of landowners and manage for a diversity of services.

Research from beyond private forest management can be applied to more responsive private forest management by practitioners. Aesthetics management, interpretation and recreation techniques, as well as long-term planning mechanisms provide a baseline for establishing a cultural ecosystem services management framework that is compatible with the goals of researchers, policymakers, and practitioners. Further research should explore additional practical techniques to continue to address the all-too-common conclusions that practitioners need to better manage for the goals of landowners, particularly when these goals focus first and foremost on the enjoyment of cultural ecosystem services.

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## Chapter 5 – Thesis Conclusion

The preceding chapters have shown from multiple vantage points that landowners clearly appreciate amenities and cultural ecosystem services. Many studies over time and space loudly echo this finding. Landowners like scenery. Landowners like peace and relaxation. Landowners appreciate the heritage values, the privacy, the recreation, and the educational values provided by their forestlands.

These factors are key to decision-making and often conflict with more intensive management goals of forestry practitioners. Results from quantitative analysis of survey data showed forest landowners with stronger amenity objectives were significantly more likely to seek assistance from a forester and to have implemented timber stand improvement. However, they were significantly less likely to have engaged in the more intensive management activity of commercial timber harvesting. Even though active management can maximize climate change mitigation, those who were most in agreement with the idea of anthropogenic global warming, the amenity-oriented landowners, were not necessarily willing to more actively manage their forestland. And those who were most actively managing their land, the financially-oriented landowners, were not as supportive of the idea of global warming. Most of the landowners interviewed and surveyed through this research indicated cultural ecosystem services and amenities were important while these landowners did not all agree on the importance of financial goals and objectives.

### *Cultural Ecosystem Services as a Proxy for Ecologically-Sound Management?*

In places where humans have permanently altered ecosystem function, management is necessary to retain the outputs of privately- and publicly-enjoyed ecosystem services. For example, when considering the defining forestry issue of the Central Hardwoods Region—oak

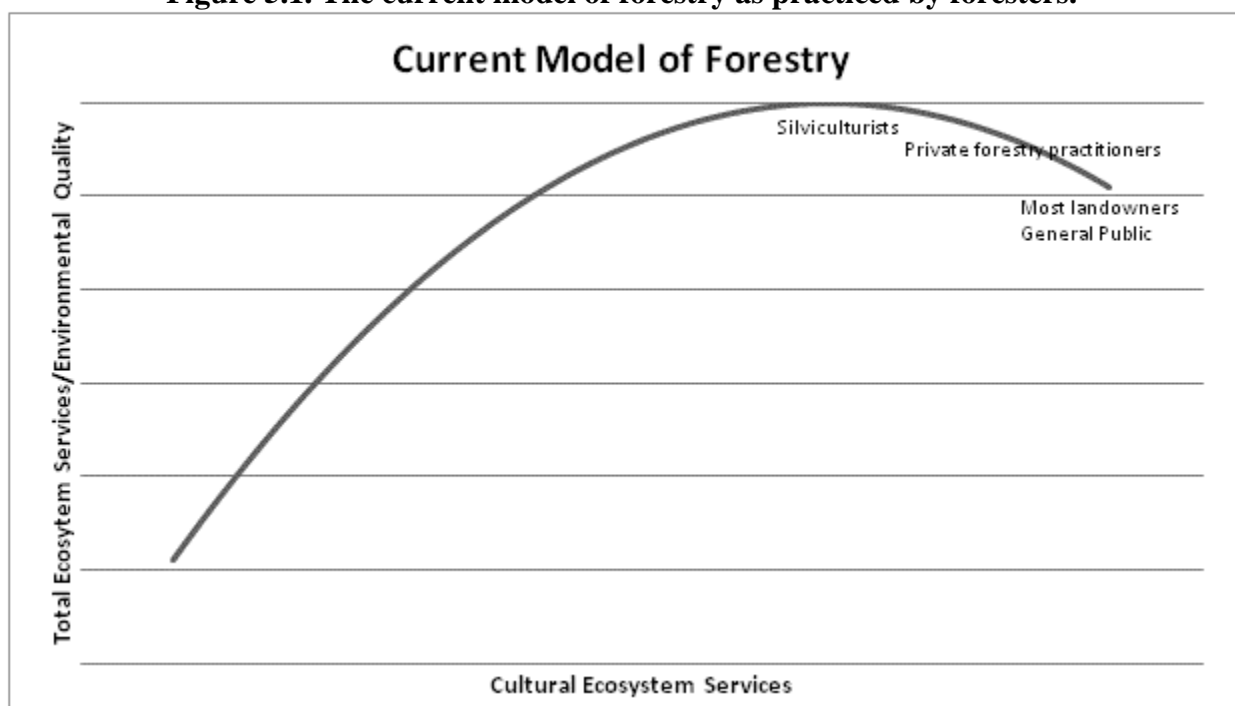
regeneration—disturbance via fire, harvesting, or other major event is necessary to regenerate oak. But these forces are increasingly excluded from private forestlands in favor of undisturbed woodlands that landowners maintain for cultural ecosystem services. Silviculturists propose clearcutting and traditional shelterwood methods for the good of the resource, but these methods rely on decimating the forest overstory canopy at the end of rotations, thus temporarily decreasing the enjoyment of cultural ecosystem services. However, as demonstrated in Chapter Four, methods to preserve the oak component of this region’s forests without decimating cultural ecosystem services are possible.

Forestry as currently researched and practiced assumes an antagonistic relationship between cultural ecosystem services and other ecosystem services. Silviculturists favor trading off cultural ecosystem services for optimal ecosystem states. Private forestry practitioners who are more exposed to the social forces at work in the field have adopted stances that straddle the line between the forestry dialogue about managing for the resource and the landowner dialogue about multiple goals and objectives. Landowners may be portrayed as sacrificing resource quality in their efforts to maintain an undisturbed woodland rich in cultural ecosystem services. While all could probably agree that a parking lot provides neither cultural ecosystem services nor other ecosystem services, the correct level of cultural ecosystem services in relation to other ecosystem services is the source of tension between foresters and landowners. This model of forestry is, however, unable to engage more than a handful of landowners. Without large-scale engagement, optimal environmental quality on a sparse distribution of parcels does not scale up to optimal environmental quality across the landscape.

As illustrated in Figure 5.1, there is generally a positive correlation between cultural ecosystem services and environmental quality. However, how this relationship is interpreted and

acted upon depends upon personal and professional backgrounds. Landowners tend to maximize cultural ecosystem services while traditional forestry advocates such as silviculturists view this cultural ecosystem service maximization as sacrificing long-term conservation. Forestry practitioners hold a position that acknowledges the compromise between landowners desire for cultural ecosystem services and traditional forestry's normative stance that multiple uses and total utility maximization are more important.

**Figure 5.1. The current model of forestry as practiced by foresters.**

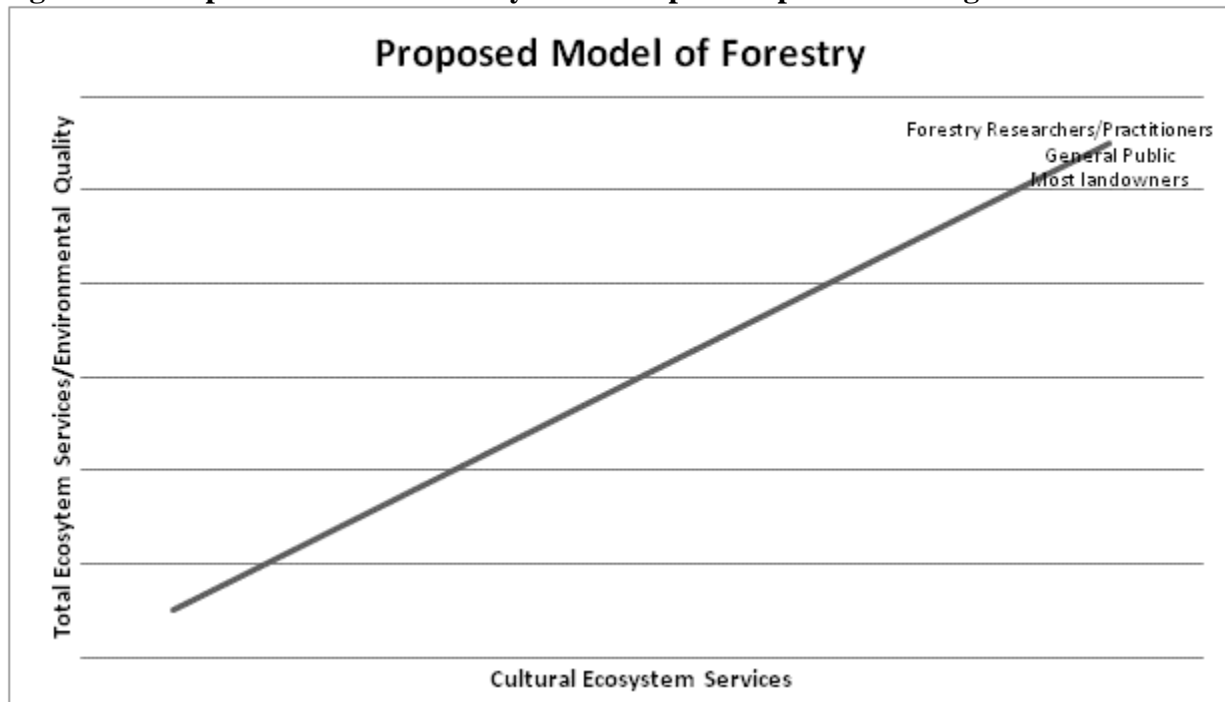


A new view of forestry, by practitioners and researchers, that cultural ecosystem services serve as an accurate proxy for resource quality may be the most effective avenue to achieving a strong and sustained relationship with landowners. This approach merges landowners' needs for cultural ecosystem services with practitioners' normative judgments about how land should be managed. If landowner engagement with forestry practitioners can be increased by better meeting landowners' needs and demands, cultural ecosystem services can likely provide a common ground that encourages better environmental outcomes across larger scales than the

current model. Practitioners managing for cultural ecosystem services can cultivate stronger relationships with a broader base of landowners, thus permanently protecting ecosystems through high-quality, long-term management on more parcels as well as formal protection mechanisms. Yet, practitioners managing for cultural ecosystem services can still practice smart, low-impact silviculture without compromising their commitment to conserving oak forests, eradicating invasive species, and providing economic returns for their clients.

This approach has been characterized in Figure 5.2. Treating the relationship between cultural ecosystem services and total ecosystem services as self-reinforcing will put researchers, practitioners, and landowners on the same page. When researchers, practitioners, and landowners can agree on how forestland ought to be managed, a constructive relationship that encourages more frequent and more productive dialogue among these parties can be cultivated.

**Figure 5.2. Proposed model of forestry that incorporates predominant goals of landowners.**



### *Policy Recommendations*

In Illinois, the 1983 Forest Development Act provides substantial incentive to grow a crop of timber. It has been effective at engaging landowners with forestry practitioners. Landowners in southern Illinois were more active in getting forest management plans than their peers in the national population of forest landowners. Many of these forest management plans address threats to private forestlands that would otherwise go unaddressed. However, this piece of legislation only indirectly addresses these threats through the objective of timber production. Survey, interview, and participant observation results strongly indicate that timber and financial objectives are not universal goals among landowners. This piece of legislation does not engage the broader audience of landowners who own for amenities and cultural ecosystem services.

The Forest Development Act's counterpart, the 2007 Conservation Stewardship Act, provides a smaller property tax incentive to reduce property taxes below highest and best use rates. It does not provide the requirement or incentive for these landowners to consult natural resource practitioners. While the property tax incentive offered makes it less financially burdensome to protect wild and open lands from development and parcelization, it does not address the range of other threats nor permanently protect the ecosystem services provided by these parcels.

Policy that treats amenities and cultural ecosystem services as equally important to timber production will more effectively address contemporary concerns about the state of the private forest resource. As policy stands, the Illinois Forest Development Act functions more as an agricultural subsidy that unintentionally creates a beneficial relationship between landowners and practitioners. Incentives to produce other ecosystem services are secondary to incentives for timber production, even though timber production has not proven essential to permanently

protecting the ecosystem services of private forestlands. The Illinois Forest Development Act should be updated to discount the early 20<sup>th</sup> century logic that timber production is the prime goal of private forest management.

### *Research & Practice Recommendations*

Forestry research and practice have not ignored the need to recognize cultural ecosystem services. But these ecosystem services are not as comprehensively addressed as timber management or its sister forest science components. Silviculturists mention aesthetics and other cultural ecosystem services as an aside to employing silvicultural systems. Practitioners have adopted less intensive silviculture on private lands to address the concerns of landowners. However, these solutions are not standardized nor comprehensive. They serve as an after-the-fact justification rather than a goal of management.

In an attempt to elevate cultural ecosystem services management to the first consideration of forestry assistance, techniques and possibilities for aesthetics management, interpretation and recreation, and conservation easements were proposed in Chapter Four as an initial framework. The list provided is not comprehensive but a preliminary framework. Further research is needed to develop this framework more thoroughly and make it applicable across regions. Additionally, finding ways to apply these techniques optimally will require effective partnerships between practitioners and researchers.

If we continue to find through research that most landowners have amenity objectives and love to enjoy cultural ecosystem services, it will mean little without action. For a profession that struggles to reconcile its noble utilitarian foundations with the changing needs of Americans, it is important to remember the words of the Illinois Technical Forestry Association (1965):

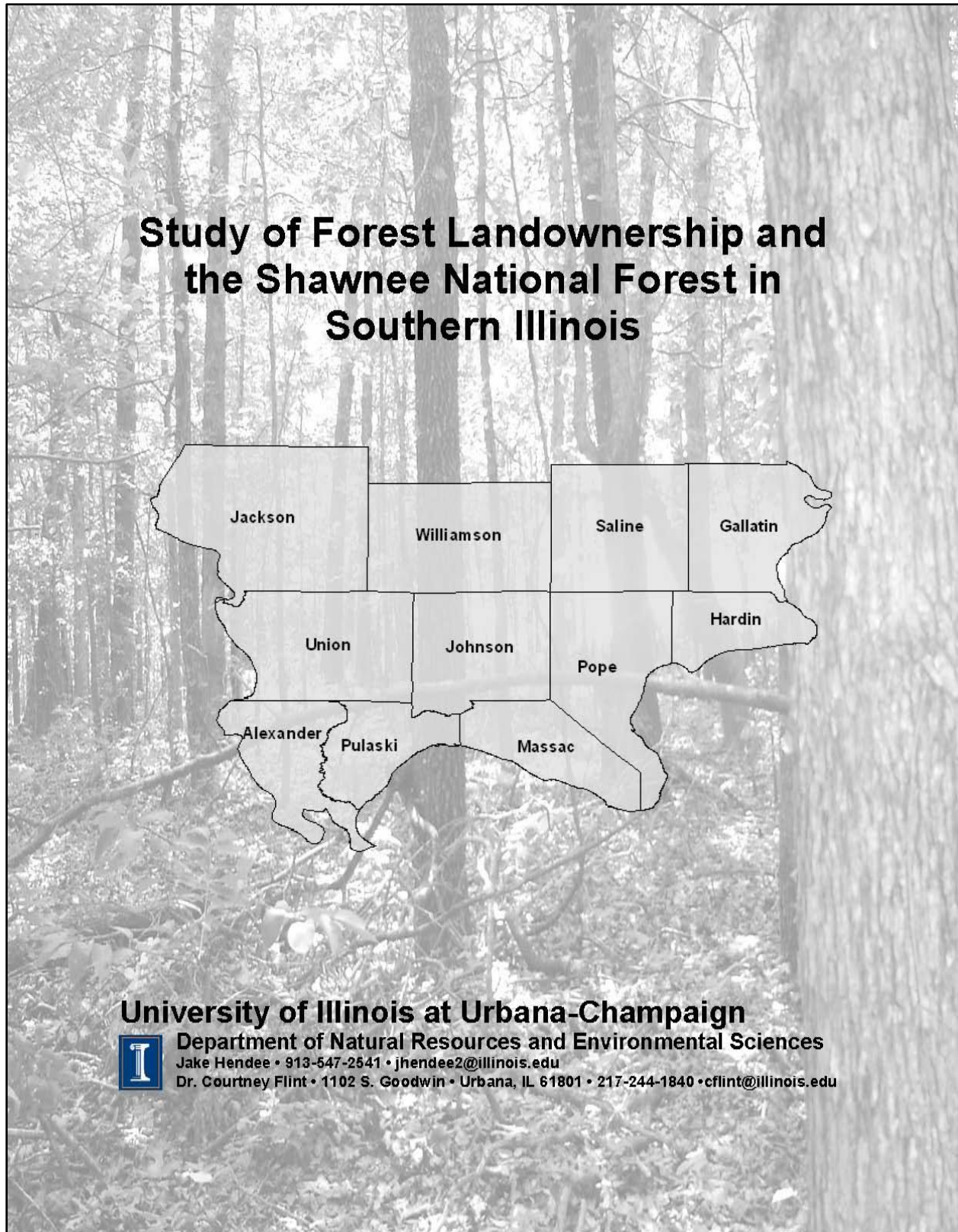
“‘The beautiful is as useful as the useful’” (p. 35).



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## Appendix A: Copy of Mail Survey Instrument



This study seeks to answer important questions on your views about forest landownership, the Shawnee National Forest, and related environmental issues. A summary of the information collected and analyzed from this survey process will be presented to local, regional, and national forest managers to improve the processes involved with forest ownership for people like you. **We appreciate your help in accomplishing these goals!**

#### Interested?

If you'd like to receive study results or just ask questions, contact [jhendee2@illinois.edu](mailto:jhendee2@illinois.edu) or call 913-547-2541.

#### Who should complete this questionnaire?

You have been randomly selected as a forest landowner in our study area using a combination of aerial photos and publicly available county landownership records. We are asking you, as a forest landowner in Alexander, Gallatin, Hardin, Jackson, Johnson, Massac, Pope, Pulaski, Saline, Union, or Williamson County in Illinois, to participate in this study.

#### Sharing your views:

- Feel free to write comments or explanations directly in this questionnaire.
- Please mail back your completed questionnaire in the prepaid envelope.
- All of your answers are completely confidential and your participation is strictly voluntary. *ID numbers are only to ensure you don't receive repeated mailings.*
- Completing the survey should take about 15-20 minutes.
- We will do our best to report findings back to your communities using local natural resource professionals and local media.
- Thank you very much for your help!

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**INITIAL QUESTION:** To ensure this questionnaire is relevant to you, please answer this initial question.

1. Do you own at least 10 acres of forestland in our study region in southern Illinois (pictured on the front cover)?

☐ Yes

☐ No → **If you answered No, please stop here and return the questionnaire in the enclosed addressed and pre-stamped envelope provided. It is important that we hear back from everyone who receives a questionnaire even if you are not a forest landowner. Returning this survey will ensure that you are not sent a follow-up questionnaire. We appreciate your assistance.**

2. In which of the following Illinois counties do you own forestland? Please mark all that apply.

☐ Alexander

☐ Johnson

☐ Saline

☐ Gallatin

☐ Massac

☐ Union

☐ Hardin

☐ Pope

☐ Williamson

☐ Jackson

☐ Pulaski

☐ Other (please list) \_\_\_\_\_

3. Which of the following best describes the location of your primary place of residence?

- ☐ My residence is in one of the 11 counties listed in question 2 and is within 1 mile of any of my forestland
- ☐ My residence is in one of the 11 counties listed in question 2 but is not within 1 mile of any of my forestland
- ☐ My residence is not in one of the 11 counties listed in question 2.

4. How is your forestland currently owned? Please mark all that apply.

- ☐ One or more individuals      ☐ Corporation  
☐ Trust      ☐ Club or Association  
☐ Partnership      ☐ Other (please specify) \_\_\_\_\_

5. Please estimate the total number of forested acres that you own. \_\_\_\_\_ acres

6. Please estimate the total number of acres that you own (forest and non-forest). \_\_\_\_\_ acres

#### FOREST LANDOWNER OBJECTIVES

7. Why do you own your forestland? Please circle the corresponding number.

	<u>Not important</u>				<u>Important</u>
a Beauty and scenery	1	2	3	4	5
b Wildlife habitat	1	2	3	4	5
c Financial investment	1	2	3	4	5
d Part of home	1	2	3	4	5
e Part of farm	1	2	3	4	5
f Privacy	1	2	3	4	5
g Pass land on to heirs	1	2	3	4	5
h Non-timber forest products (i.e. berries, herbs)	1	2	3	4	5
i Firewood production	1	2	3	4	5
j Timber production	1	2	3	4	5
k Hunting	1	2	3	4	5
l Other recreation (please list) _____	1	2	3	4	5
m Other (please list) _____	1	2	3	4	5

8. Have you ever done or hired someone to do any of the following on your property? Please circle the corresponding number.

	<u>Yes</u>	<u>No</u>
a Commercial timber harvest	1	2
b Prescribed burn on my <u>forest</u> property	1	2
c Prescribed burn on my <u>non-forest</u> property	1	2
d Timber Stand Improvement (TSI) operation to remove undesirable trees	1	2
e Tree planting	1	2

9. Where do you get forest management information? Please mark all that apply.

- ☐ Consulting Forester      ☐ Logger  
☐ Extension Office      ☐ Word of mouth  
☐ Environmental organization      ☐ Publications  
☐ Illinois Department of Natural Resources      ☐ Soil and Water Conservation District  
☐ Illinois Forestry Association      ☐ USDA Forest Service  
☐ Illinois Forest Resource Center at Dixon      ☐ USDA Natural Resources Conservation Service  
    Springs Agricultural Center      ☐ Other (please list) \_\_\_\_\_

10. Do you have a written management plan through the Illinois Department of Natural Resources or a consulting forester for any of your forest properties?

- ☐ Yes
- ☐ No
- ☐ I don't know

11. The University of Illinois agricultural field research station at Dixon Springs provides forestry education through the Illinois Forest Resource Center. Have you used this service?

- ☐ Yes, regularly
- ☐ Yes, once in a while
- ☐ No

12. Do you have any comments or suggestions about services provided by the Illinois Forest Resource Center?

13. Please rate your level of concern about the following threats to your forest property. Please circle the corresponding number.

	Not concerned	-----	Very concerned	
a Drought	1	2	3	4 5
b Earthquake	1	2	3	4 5
c Fire	1	2	3	4 5
d Flooding	1	2	3	4 5
e Forest insect pests	1	2	3	4 5
f Global warming	1	2	3	4 5
g Hazardous/toxic materials emergency	1	2	3	4 5
h Change from oak-hickory forest to beech-maple forest	1	2	3	4 5
i Invasive plant species	1	2	3	4 5
j Severe weather	1	2	3	4 5
k Soil erosion	1	2	3	4 5
l Other (please list) _____	1	2	3	4 5

#### SHAWNEE NATIONAL FOREST

14. How far is your primary place of residence from the Shawnee National Forest? Please mark one.

- ☐ 0-5 miles
- ☐ 5-10 miles
- ☐ 10-15 miles
- ☐ 15-20 miles
- ☐ 20-25 miles
- ☐ More than 25 miles

15. Does any of your forestland directly adjoin the Shawnee National Forest?

- ☐ Yes  
☐ No

16. Have you done the following activities during the past 12 months? Please circle the corresponding number.

	<u>Yes</u>	<u>No</u>
a Visited the Shawnee National Forest as a destination	1	2
b Hiked in the Shawnee National Forest	1	2
c Hunted in the Shawnee National Forest	1	2
d Ridden a horse in the Shawnee National Forest	1	2
e Read about the Shawnee National Forest in a local news publication	1	2
f Discussed the Shawnee National Forest with others	1	2
g Contacted the Forest Service about Shawnee National Forest issues	1	2

17. Please indicate your agreement or disagreement with the following statements about the Shawnee National Forest. Please circle the corresponding number.

	<u>Strongly Disagree</u>			<u>Strongly Agree</u>		
a I am satisfied with the management of the Shawnee NF.	1	2	3	4	5	
b I am knowledgeable about management of the Shawnee NF.	1	2	3	4	5	
c More timber should be harvested from the Shawnee NF.	1	2	3	4	5	
d More wilderness should be designated in the Shawnee NF.	1	2	3	4	5	
e Horseback riders should be allowed more access in the Shawnee NF.	1	2	3	4	5	
f ATV riders should be allowed in the Shawnee NF.	1	2	3	4	5	
g Environmental groups should have less say in management of the Shawnee NF.	1	2	3	4	5	
h The risk of fire in the Shawnee NF is a major concern.	1	2	3	4	5	
i It is difficult to access my land due to the Shawnee NF.	1	2	3	4	5	
j Shawnee NF users trespassing on private land is a problem.	1	2	3	4	5	

#### YOUR FOREST AND THE ENVIRONMENT

18. Please indicate your agreement or disagreement with the following statements about forest management. Please circle the corresponding number.

	<u>Strongly Disagree</u>			<u>Strongly Agree</u>		
a Timber harvesting is a management tool that can be used to benefit the environment.	1	2	3	4	5	
b Prescribed fire is a management tool that can be used to benefit the environment.	1	2	3	4	5	
c The environmental quality of forestland suffers without human management.	1	2	3	4	5	
d The environmental quality of forestland is best maintained when natural processes are allowed to run their course without human intervention	1	2	3	4	5	

19. Which of the following statements best describes your position on global warming? Please mark one.

- ☐ Global warming is not occurring
- ☐ I am unsure that any global warming is occurring.
- ☐ Global warming is occurring and is primarily due to human activities.
- ☐ Global warming is occurring and is primarily due to natural causes
- ☐ Global warming is occurring, but explanations are not well understood

20. Are you concerned that global warming will lead to the following effects on your forestland? Please circle the corresponding number.

	<u>Not concerned</u>				<u>Very concerned</u>
a More damaging insects	1	2	3	4	5
b Increased drought	1	2	3	4	5
c Increased flooding	1	2	3	4	5
d Increased risk of fire	1	2	3	4	5
e More severe storms	1	2	3	4	5
f Shifting natural ranges of animals	1	2	3	4	5
g Shifting natural ranges of plants	1	2	3	4	5
h Other (please list) _____	1	2	3	4	5

21. Please indicate your agreement or disagreement with the following statements about global warming and forest management on your property. Please circle the corresponding number.

	<u>Strongly</u>				<u>Strongly</u>
	<u>Disagree</u>				<u>Agree</u>
a I am willing to <u>voluntarily</u> alter my forest management practices to address global warming.	1	2	3	4	5
b I would be willing to alter my forest management practices to address global warming <u>if compensated to do so</u> (i.e. carbon credits).	1	2	3	4	5
c I am willing to <u>voluntarily</u> convert more of my land to forestland to address global warming.	1	2	3	4	5
d I would be willing to convert more of my land to forestland to address global warming <u>if compensated to do so</u> (i.e. carbon credits).	1	2	3	4	5
e I do not feel it is necessary to address global warming.	1	2	3	4	5

#### YOUR COMMUNITY

22. Do you consider your current place of residence as being in a rural area?

- ☐ Yes
- ☐ No

23. Which of the following do you most closely identify as your community of residence? Please mark one.

- ☐ My city or town
- ☐ My county
- ☐ My region (i.e. southern Illinois)
- ☐ My state



24. For each of the following areas, please circle the number that best describes your community of residence.

		Very Poor	-----	Excellent	
a	Quality of life	1	2	3	4 5
b	Local economy	1	2	3	4 5
c	Beauty and scenery	1	2	3	4 5
d	Quality of communication among residents	1	2	3	4 5
e	Recreational opportunities	1	2	3	4 5
f	Providing of necessary services	1	2	3	4 5
g	Climate	1	2	3	4 5

**PERSONAL CHARACTERISTICS**

**Finally, we have a few questions about you. We assure you of complete confidentiality. Please mark or fill in the response that best describes your answer.**

25. What is your age? \_\_\_\_\_ years old

26. Are you?

- ☐ Male  
☐ Female

27. Are you?

- ☐ White  
☐ American Indian or Alaska Native  
☐ Black or African American  
☐ Hispanic  
☐ Asian  
☐ Other \_\_\_\_\_

28. What is the highest level of education that you have completed?

- ☐ Less than a high school degree  
☐ High school degree or GED  
☐ Some college or post high school training  
☐ Two-year technical or associate degree  
☐ Four-year college degree (BA/BS)  
☐ Advanced degree (Master's, JD, MD, Ph.D.)

29. Which of the following best describes your current employment situation?

- ☐ Employed for pay by a company/business/government  
☐ Self-employed  
☐ Unemployed  
☐ Retired  
☐ Homemaker



30. Are you, or have you been, employed in an occupation related to forest management, forest products, or timber harvesting (either full time or part time)?

- ☐ Yes→ If yes, type of forest-related occupation\_\_\_\_\_
- ☐ No

31. Are you, or have you been, involved in agricultural production either full- or part- time?

- ☐ Yes→ If yes, type of agriculture-related occupation\_\_\_\_\_
- ☐ No

**THANK YOU VERY MUCH FOR YOUR PARTICIPATION!!!**

32. Please feel free to use the available space on this page to tell us any additional information or share any additional comments. Please return this questionnaire in the enclosed addressed envelope. No additional postage is necessary.

## Appendix B: Prediction Tables for Logistic Regression Models

### Prediction Table for Seek Information from Forester Logistic Regression Model

		Predicted		% Correct
		No Forester	Forester	
<b>Observed:</b>	No Forester	73	81	47.4%
	Forester	47	135	74.2

This model had an overall prediction percentage of 61.9% compared to a null prediction percentage of 54.2%

### Prediction Table for Written Forest Management Plan Logistic Regression Model

		Predicted		% Correct
		No Plan	Plan	
<b>Observed:</b>	No Plan	199	26	88.4%
	Plan	80	43	35.0%

This model had an overall prediction percentage of 69.5% compared to a null prediction percentage of 64.7%

### Prediction Table for Commercial Timber Harvest Logistic Regression Model

		Predicted		% Correct
		No Harvest	Harvest	
<b>Observed:</b>	No Harvest	115	54	68.0%
	Harvest	54	136	71.6%

This model had an overall prediction percentage of 69.9% compared to a null prediction percentage of 52.9%

### Prediction Table for Timber Stand Improvement Logistic Regression Model

		Predicted		% Correct
		No TSI	TSI	
<b>Observed:</b>	No TSI	196	28	87.5%
	TSI	80	48	37.5%

This model had an overall prediction percentage of 69.3% compared to a null prediction percentage of 63.6%

## Appendix C: Summary of Coding Categories for Chapter 3

For each code discussed above, direct quotes from the transcripts are presented in the table below. Any personal identifying information has been removed to protect confidentiality of participants. If relevant response is split by extra text, a ... has been added for increased clarity and brevity.

<b>Ecosystem Service Code</b>	<b>Transcribed Responses</b>
<b>Personal Ecosystem Services</b>	
Income, finances, or economics	<p>“...livelihood, economic livelihood, you know the cash, the cash return from the real estate, uh, livelihood...”</p> <p>“...the cleared ground, I get CRP payments. The timber ground I sell timber off it once in a while.”</p> <p>“...well the crops land is cash rented. The uh, remainder is, I hire the hay bailed, and hopefully sell it for a little profit. The hay deal is not profitable in this country really... the only timber that I ever sold was...”</p> <p>“...production, I get a lot of benefits from that.”</p> <p>“...I bought the damn stuff pretty cheap, but you know what the hell recreation land just went crazy too, see?”</p> <p>“My income. We’re farmers 100%.”</p> <p>“...a portion of my retirement... then you get a little bit of income off of it too.”</p> <p>[inaudible] Interviewer: [laughs] “Anything beyond income?”</p> <p>“...it’s always provided income...”</p> <p>“Value. That’s pretty much it as far as (brother) and I are concerned. It’s an asset and that’s it.”</p> <p>“...it’s provided an income...”</p> <p>“...(the farmer) pays rent to the landowners, of which I am one, so that provides an income that way. And then the profit that (the farmer) has, it’s a share of it that’s mine so that’s profit, or an income that way.”</p> <p>“...it provides an income too.”</p> <p>“...for grandma, it’s to provide income to pay her taxes on it.”</p> <p>No audio (from notes):</p> <p>“Income”</p> <p>“Income”</p>
Peace, comfort, or relaxation	<p>“...the peacefulness is probably the best thing that I obtain. Being able to sit out here [laughs] and see the wild life, uh, sit here and not have a neighbor staring you know, off of another postage stamp lot... the peacefulness of living as close to or in the woods as you can, I mean, so many people I mean when I built my house in (another county), I went and cut out only enough trees to set, build my house inside the woods. I mean that was the first house I’d ever built. I couldn’t do it here, but I kept as many trees as close to the house as I could afford to keep, you know, on this, on this lot. But, just the preservation of nature, the peacefulness, the I don’t know what the word, the ambience of being able to live as close to nature and still have all the comforts of home...”</p> <p>“It’s a place for me to relax.”</p> <p>“...very high quality of life situation that we have... it’s a retreat, we basically, this is the kind of place we like to go on vacation, and we live here.”</p> <p>“...peace of mind. Uh, I don’t care if the bottom drops out of the stock market or anything else, as long as I can stay right here and make just enough to keep this land, pay the taxes and whatever I need to do, um, my mortgage payment if there I one, I’m gonna eat, I’m gonna survive, I’ve got two ponds on this place that are stocked very well with some nice fish, even right now we very rarely go to the store to buy meat.”</p> <p>“Comfort and enjoyment...”</p> <p>“...peace of mind...”</p> <p>“...the beauty and the serenity, peacefulness of the place. It’s my little haven back</p>

	<p>here. I'm only 5 miles from town and as you can tell, you can hear the highway a little bit, and sometimes you can hear neighbors and you never know who it is, so it's just really the serenity, the personal pleasure of the place, location."</p> <p>"It's a peaceful place to be."</p> <p>"Just, probably kind of a peace of mind, you're grateful to the person who made this earth."</p> <p>"Comfort, um, that's a beauty that's not one of these man-made, and enjoyment."</p> <p>"Like I say, to get away."</p> <p>"Security. Peace."</p> <p>"Peace. I don't worry about the money, I just like the peace and quiet."</p> <p>"Just kind of a relaxation, place to get away."</p> <p>No audio (from notes): Sense of peace</p>
Good place to live, raise children, call home, or leave a legacy (12)	<p>"...just the pleasure of living here...it's a freedom you know to live in the country like this..."</p> <p>"...it's just, it's home. It's our home. And uh, I hope my grandkids' home someday."</p> <p>"...a home, and those are the issues that we mentioned earlier, a place to call home..."</p> <p>"...it's a beautiful spot to live. And of course, the ownership, it's nice to know you've got property, having land is great because the good Lord is not going to make anymore of it."</p> <p>"...it's provided a good place to raise a family and kids."</p> <p>"...it's provided a life for my family, you know, enjoyed the pride of ownership, you know, land, people that don't own land don't understand the attachment."</p> <p>"...a place for the kids to grow up on."</p> <p>"...a place to take my children."</p> <p>No audio (from notes): Good place to live Good place to live (country) Home You can't go home</p>
Hunting, meat, or venison (10)	<p>"...gives us a lot of deer meat... I get those landowner permits and we usually get those filled and it keeps us in deer meat all year long. You know, um, real good in spaghetti and chili."</p> <p>"...as hunting ground and stuff."</p> <p>"Deer meat. [laughs]"</p> <p>"...we have venison in the freezer..."</p> <p>"...goes back to the hunting..."</p> <p>"...the hunting situation..."</p> <p>"...I used to hunt and fish all the time."</p> <p>"...you could generalize it as recreation, which turns out to be mostly hunting..."</p> <p>"...it's a place to go hunting..."</p> <p>No audio (from notes): Place to hunt for friend from another state</p>
Aesthetics, beauty, or scenery (8)	<p>"...the aesthetic value..."</p> <p>"...the scenery, just being able to go look at it..."</p> <p>"...just the beauty and the serenity..."</p> <p>"...it's just the aesthetic value."</p> <p>"...the beauty of the area, it's a beautiful spot to live."</p> <p>"Beauty."</p> <p>"I like to take pictures, butterflies, wildflowers, and I enjoy the scenes."</p> <p>"Beauty."</p>
Privacy (7)	<p>"...not have a neighbor staring you know, off of another postage stamp lot..."</p> <p>"...you have privacy..."</p> <p>"My biggest problem is I don't want some son of a bitch next door to me right looking in my window all the time. That's why I got a, about a quarter of a section</p>

	<p>land here... there ain't no way in hell anybody gonna get around me."</p> <p>"Privacy is one of the big things for us, that's why I've, that's why we built out here, instead of over here... You know we can, I can, when the trees are off, I can see the vehicles going down the highway or whatever, if I go upstairs. When you go down the highway right now because of these trees here and the leaves, you can't see that. But you can't, when you get back down here, you just see back through here and see it, I guess be through here, you can see the top of it from the highway. It's privacy."</p> <p>"...privacy..."</p> <p>"We just like it because it gives us a buffer between other people and like I say, if we could have bought this section here one time it's for sale, we would have bought it to give us more of a buffer, but we couldn't get access to it at the time. [inaudible] Just give us more of a buffer away from people. What's the saying? Good fences make good neighbors?"</p> <p>"Privacy. Privacy is very important to me."</p>
Other wildlife (7)	<p>"Being able to sit out here [laughs] and see the wildlife..."</p> <p>"...it's nice to see the turkey out there, we get quite a few pictures of turkey. And deer as well..."</p> <p>"I just like to watch the wildlife."</p> <p>"I love, I love animals, every kind of animal, you know you just love animals..."</p> <p>"I mean there is like deer, turkey, I pretty much got everything, we have bald eagles coming into the pond quite a bit... a problem with the beavers like everybody else down here... coyotes become a problem, bobcats are out there... the one bird that comes around there, they like fly into the ponds, they dive, they fall like straight down, you ever see?"</p> <p>"...it's a great habitat for all the animals to come and go. Like I said, in fact I've been warring with squirrels that found my pear tree this year, so I've been warring. Other than that, [inaudible joke]. And the deer. And there's foxes back there and raccoons... Coyotes and foxes and raccoons. Raccoons, I live trap them and take them over to (nearby lake) and turn them loose over there in the forest over there because they get into everything in sight here. Rather than kill them, I take them at least 10 miles away turn them loose by the big creek over there. Somebody says, 'Aw, just shoot them.' I said, 'They're just trying to make a living like everybody else.' Catch 'em and relocate 'em, you know?"</p> <p>"...we've got a few turkeys now, enjoy seeing them."</p>
Hobby or something to do (6)	<p>"...something to do, which never ends."</p> <p>"Something to do [laughs] ... don't see how I ever had time to work after I retired..."</p> <p>"...it's kind of a hobby, go down there, kind of work, put in food plots, trim trees, clean up. Since I'm retired that's what I do with my time."</p> <p>"Keeps me out of the taverns, always something to do out here."</p> <p>"Headaches. [laughs] Uh no don't put that down. It is uh, well my dad, he worked construction, same as I do, his whole life but farming is what he wants to do. So it is his passion I guess...it's a big hobby, I mean you've got 150 head of cows, it's a big hobby."</p> <p>No audio (from notes): Hobby time</p>
"Nature" (4)	<p>"...preservation of nature..."</p> <p>"...you're in harmony with nature."</p> <p>"It's a place for me to see nature. It's a place for me to go..."</p> <p>"The nature area, the nature aspect is like, I couldn't ask for anything better."</p>
ATVs or Horse Trail-riding (3)	<p>"Well, this property here, there's riding trails all over, from my kids, my grandkids and my kids with their ATVs and it also makes it easy for me to get into anywhere on it, but all this, if I had brought my ATV I could show you, you know, but there's trails all over here."</p> <p>"...my grandkids come home we fish and whatever, and uh, they 4-wheeler all over the place..."</p> <p>"Ride 4-wheelers and stuff."</p>

“Country” (3)	<p>“...it’s a freedom you know to live in the country like this...”</p> <p>“...like to get back out there and just roam around, I grew up in the country, when I was a teenager that was my thing, I’d get home from school, grab the shotgun and be gone... 700, 800 acres I could roam.”</p> <p>No audio (from notes):</p> <p>A lot of people want to live in the country - good neighborhood "keeping it country"</p>
Firewood (2)	<p>“And we trim for you know, for firewood and...”</p> <p>“...I was taking down trees and stuff and selling them for firewood.”</p>
Freedom or independence (2)	<p>“...it’s a freedom you know to live in the country like this...”</p> <p>“...it’s given me an opportunity to do things that I want to do, when I want to do them, how I want to do them, just an independence that I didn’t have in other jobs. I prefer it.”</p>
<b>Environmental Ecosystem Services</b>	
Wildlife or wildlife habitat (15)	<p>“...as far as the wildlife or the people?”</p> <p>“Well it’s coverage for wildlife, stuff like that.”</p> <p>“Well the wildlife it draws in... As far as wildlife goes, we have more eagles coming in, and it’s quite a, very interesting.”</p> <p>“...certainly to the animals because there is so much construction going on all over the place...”</p> <p>“It’s just a habitat place for animals.”</p> <p>“And we mentioned the quail, I think that’s another reason we lost our quail population, when I was a kid growing up in this area, and learning to quail hunt, every farmer had a little patch of corn here, a little patch of beans here, and a little patch of something here, not big farms, and it was just ideal for quail and of course you could see with turkey, for instance, which were brought back into this country. It has expanded like crazy but that’s because there’s habitat for them.”</p> <p>“...yeah for the habitat...”</p> <p>“...food for animals...”</p> <p>“I think it provides great habitat for deer and I remember the first wild deer I saw here in southern Illinois... Big deal? There wasn’t such a thing as deer, around this country and we was down in land we owned south and it was in the spring time and we looked up and I can still see those three deer running across that field, and we all just stopped in awe. And I was a kid, I mean, this was 52, 53 years ago. We just stopped in awe and saw them deer and we talked to the game warden and he surmised that they come up from the (wildlife refuge). And I remember when there wasn’t a deer season. I remember when they started deer season, back when I was in high school. And I remember never seeing a turkey, not knowing what a wild turkey was. And at one time, many years ago, I saw my first wild turkey, about 14 or 15. And now they’re thick. I turn the corner about 3 winters ago over here and I looked at that wheat field and I said, ‘What is that? That’s a bunch of geese. That ain’t geese. That’s turkey’ and my son was with me and we started counting and we counted over 100 and when we turned down the other road the other way, the wheat field kind of dropped off like this [makes a motion] and whenever we could see the back side of that, there was that many on the backside, I mean there was 200-300 turkeys out there in our wheat field. I just could not believe it. So yeah it provides a lot of wildlife habitat.”</p> <p>“...providing a habitat for wildlife, also. Additional habitat, or managed habitat, whatever.”</p> <p>“...deer population is up tremendously, turkey population is making a heck of a comeback. You don’t want to talk about the cats [laughs] so yeah I think it’s all necessary... They were here before we were.”</p> <p>“I think you know doing the (timber stand improvement) and the lower fields of the grain I think you’re helping again, you know it’s back to the turkeys, the deer, the wildlife. You know it’s all about wildlife management.”</p> <p>“I mean we try to keep the trees, the wildlife going, especially, you know, more</p>

	<p>ponds you build the more wildlife it draws to it.”</p> <p>“Other than habitat, not really.”</p> <p>No audio (from notes):</p> <p>Diversity of habitat for multitude of critters</p>
Erosion prevention or water quality (9)	<p>“I mean when it rains here, most of these creeks run pretty clear, you know, because it’s coming from the Shawnee Forest... the purification of the water in the runoff that goes through the forest, versus you know, commercial agriculture production...”</p> <p>“Well we live close to the national forest, so we really don’t have some of the erosion issues that other people have...”</p> <p>“Try to keep the erosion controlled, you know the erosion in control where it doesn’t filter down into (nearby lake). Of course they make you do this now, but this is classified as highly erodible land, and uh, try to keep things from running down into the lake to people’s water supply and that kind of thing...”</p> <p>“...a lot of the land is highly erodible.”</p> <p>“I hope they’re treating it right and making sure that it isn’t washing off down the gullies and that sort of thing. But, the property that I have here is not really farmable in terms of row crop producing.”</p> <p>“I hadn’t thought of it that way. It doesn’t a pretty good job of controlling erosion.”</p> <p>“I’m not plowing it so it’s not forcing the land buildup of sediment here and there.”</p> <p>“...we try to take care of it so it doesn’t wash...”</p> <p>“...you know planted it all in CRP, most of the CRP to trees, so I felt, certainly it’s land, it’s considered fairly highly erodible, and so just the aspects of getting land back into trees. I probably should never, most of it at least should never have been in farm production in the first place.”</p>
Development prevention or “keeps the population down” (7)	<p>“...sit here and not have a neighbor staring you know, off of another postage stamp lot...”</p> <p>“...there is so much construction going on all over the place, throughout the neighborhood, any back road you turn on there is somebody building a new house or a vineyard.”</p> <p>“I’d hate to see somebody come in and put a subdivision in there. Once I’m gone who knows what happens, you know. I see it all over, the woods is shrinking... Shrinking to residential and business, I guess some farming. Farming is not too good around here. Compared to where I come from. People scratching a living on the ground here.”</p> <p>“It kind of keeps the population down in this area. [laughs]. Myself and the neighbors, we’ve pretty much got all of this tied up although I did sell this off down the road, broke it up... Yeah, I wish this road was still gravel actually. [laughs] Too much traffic.”</p> <p>“I’m not selling lots. There’s already too many people everywhere.”</p> <p>“I think it’s helpful the fact that its kept natural which would be in trees I think is helpful to the, well the worldwide environment. I mean it’s a green thing.”</p> <p>No audio (from notes):</p> <p>A lot of people want to live in the country - good neighborhood "keeping it country"</p>
Clean air or produces oxygen (6)	<p>“...you can actually see what a forest does as far as the purification of not only the air...”</p> <p>“...we help clean up a lot of air with the timber and the tree planting and the warm season grasses, lets all my neighbors and you enjoy breathing, you know, around here.”</p> <p>“Well yeah I hope having woodlands puts oxygen in the air, filters the air.”</p> <p>“...as long as those trees are there, trees produce oxygen...”</p> <p>“Air, you know, what the trees provide...”</p> <p>No audio (from notes):</p> <p>Providing oxygen</p>
Carbon sequestration (3)	<p>“The fact that the trees absorb carbon dioxide is about all I’m contributing...”</p> <p>No audio (from notes):</p> <p>Sequestering carbon</p>

	Carbon credits
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